

Aufgabe 8-1

 $\epsilon = 5,$
 $\text{minPts} = 2$ $\epsilon = 5,$
 $\text{minPts} = 4$ $\epsilon = 2,$
 $\text{minPts} = 4$

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

Data Mining Tutorial

Clusteranalyse Teil IV

Ludwig-Maximilians-Universität München

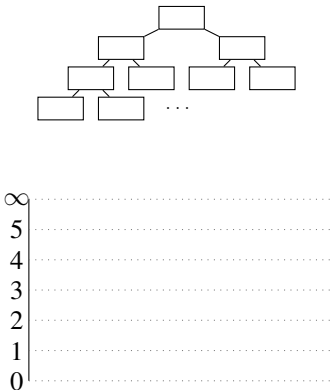
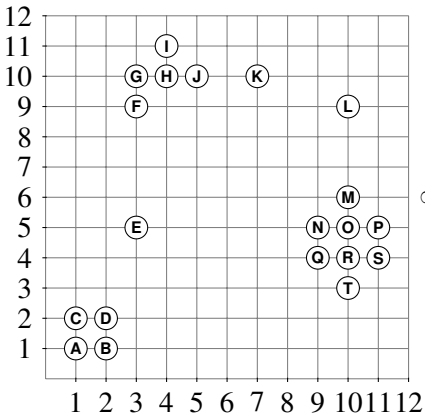
11. und 12.01.2018 — KDD Übung

Aufgabe 8-1

$\epsilon = 5$,
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minPts = 4
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

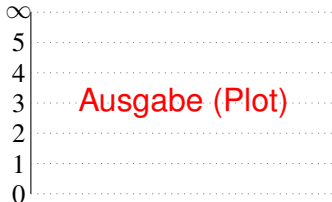
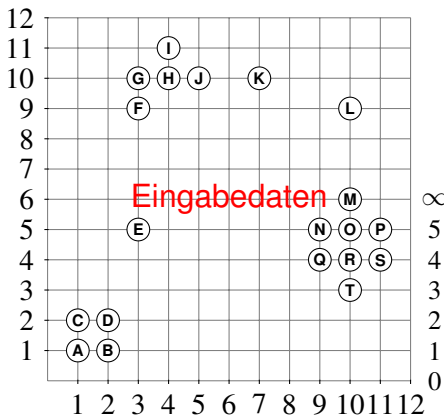


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$\epsilon = 5$,
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Heap: Für die Vorlesung reicht eine Sortierte Liste

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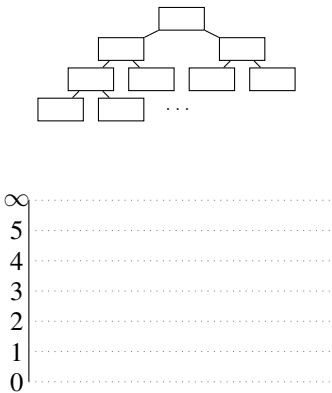
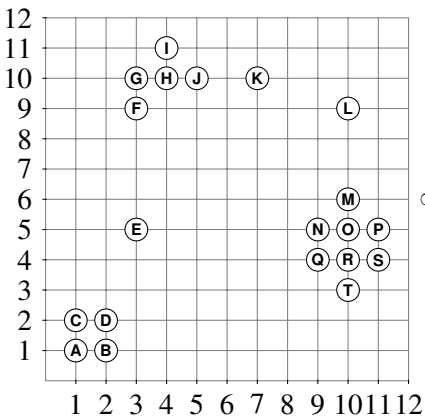
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Vergleich

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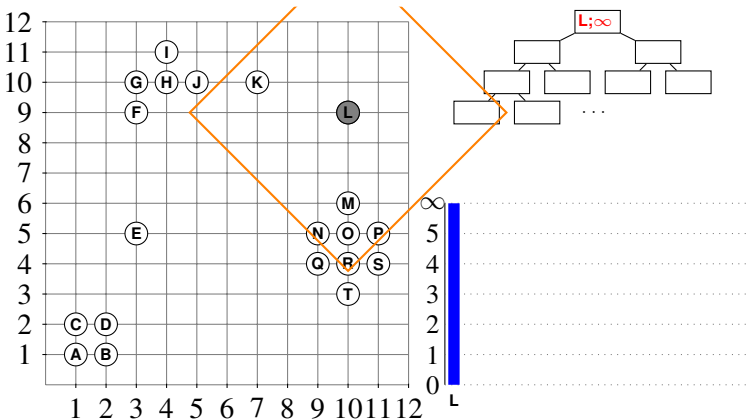
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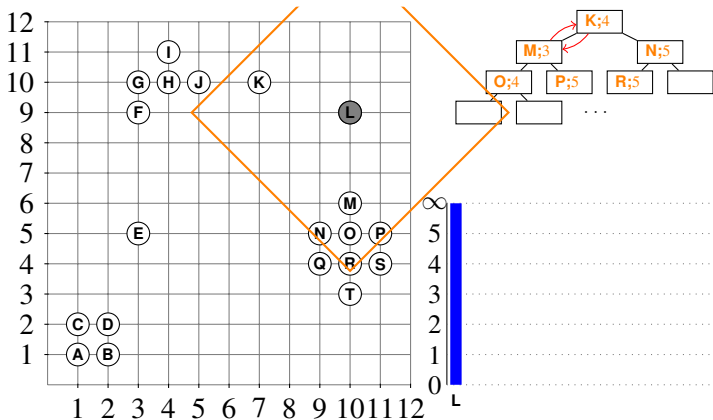
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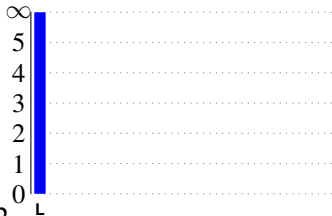
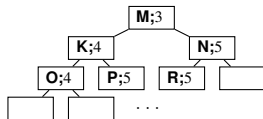
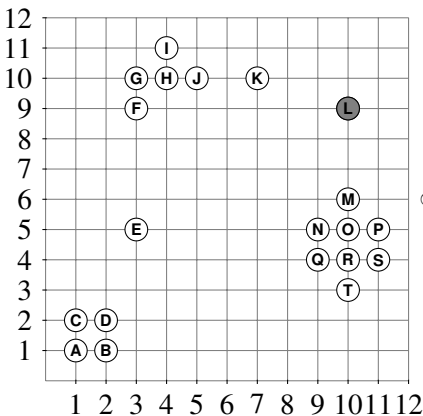
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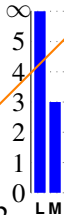
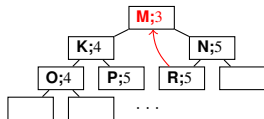
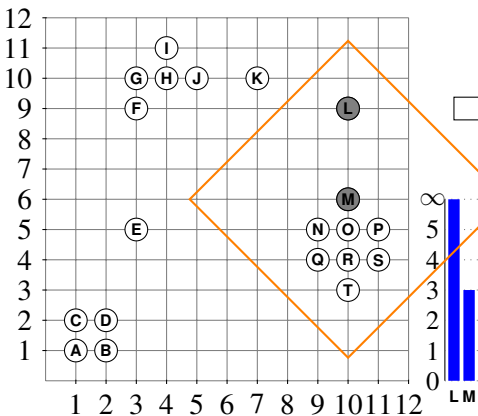
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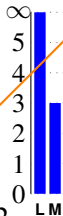
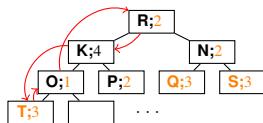
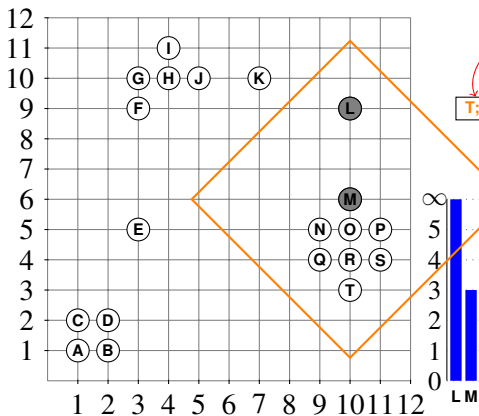
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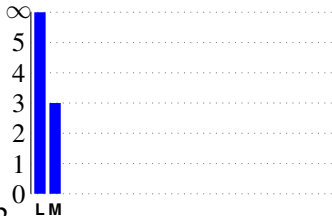
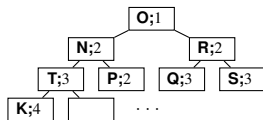
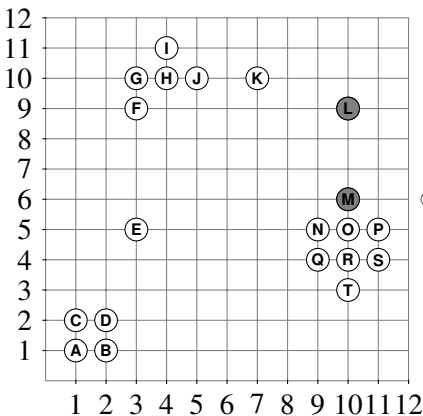
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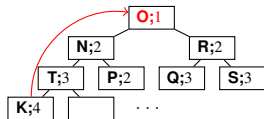
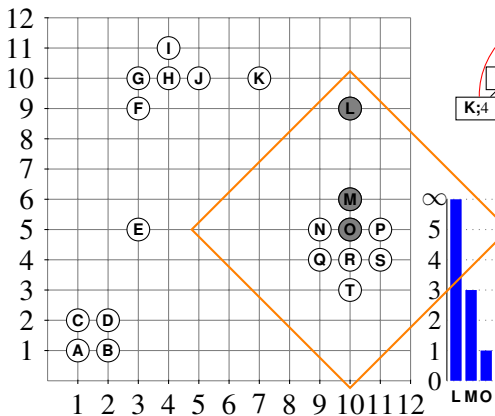
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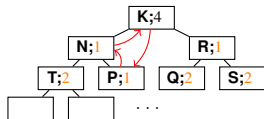
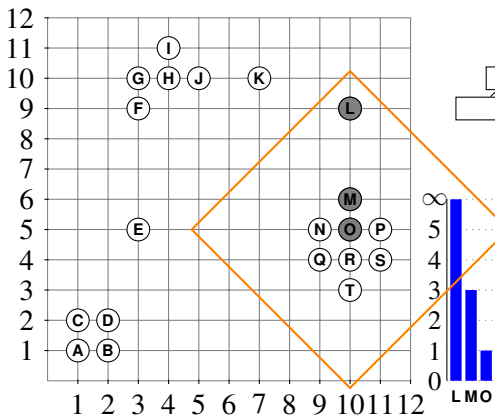
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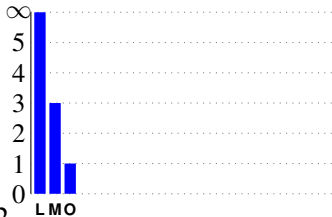
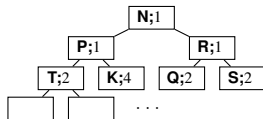
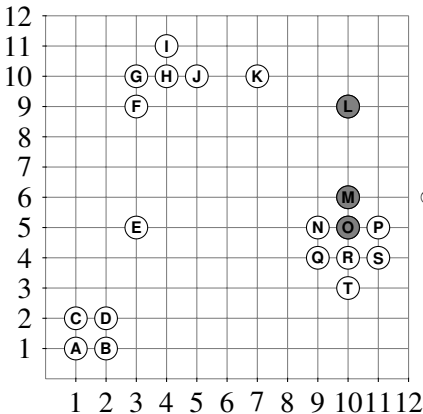
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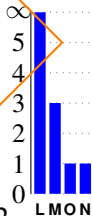
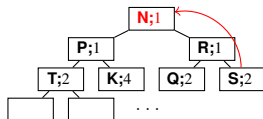
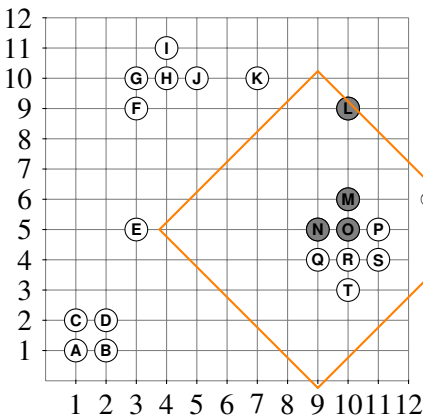
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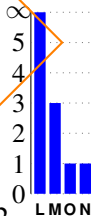
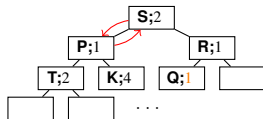
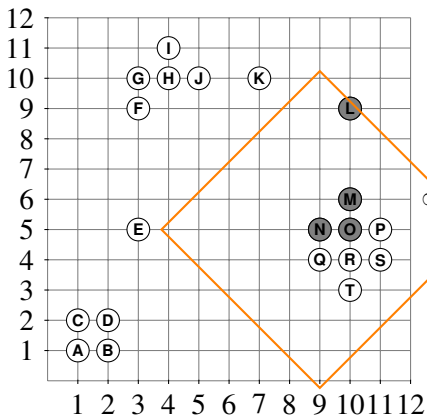
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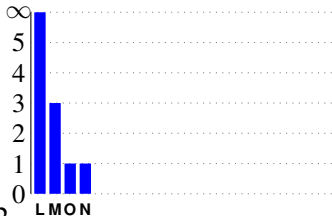
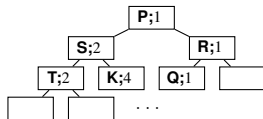
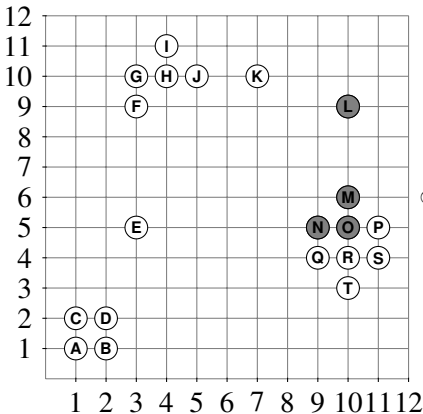
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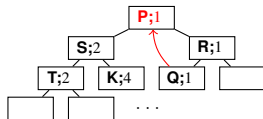
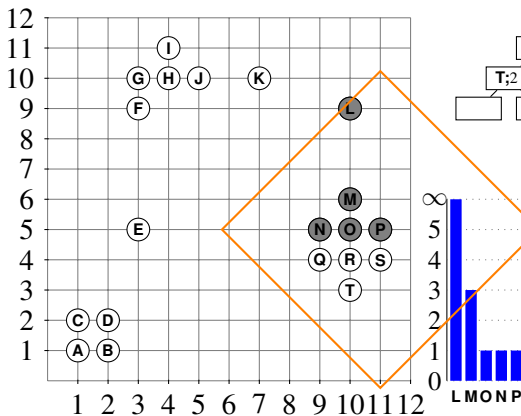
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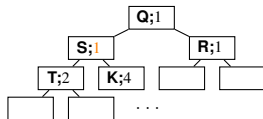
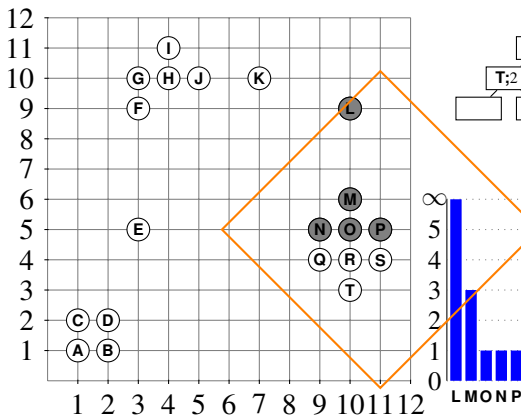
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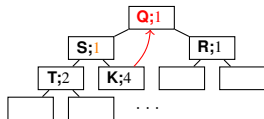
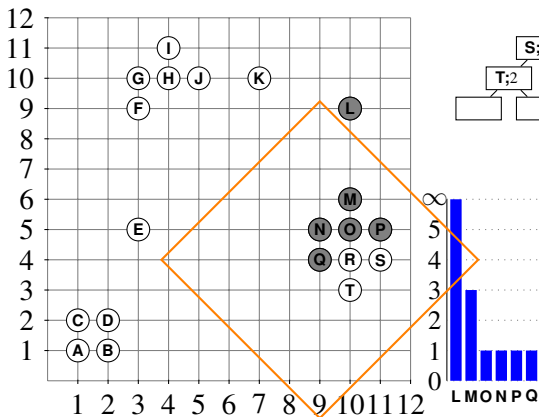
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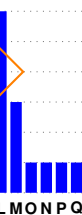
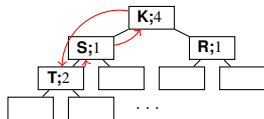
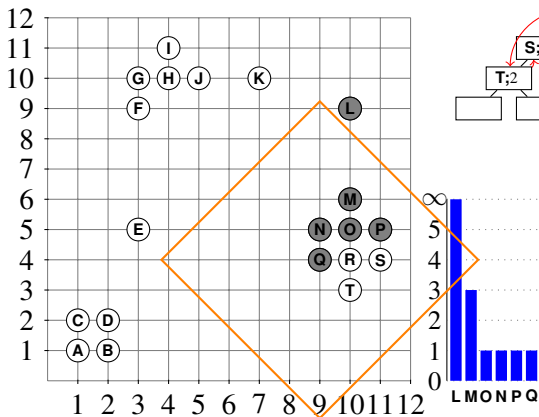
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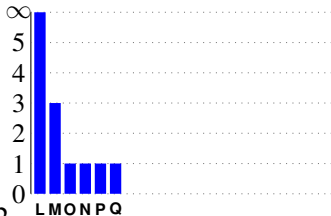
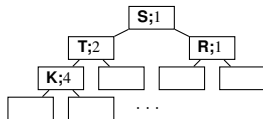
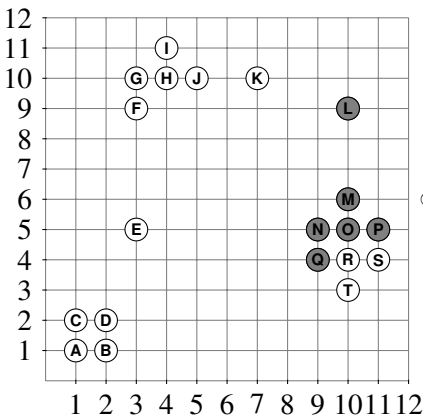
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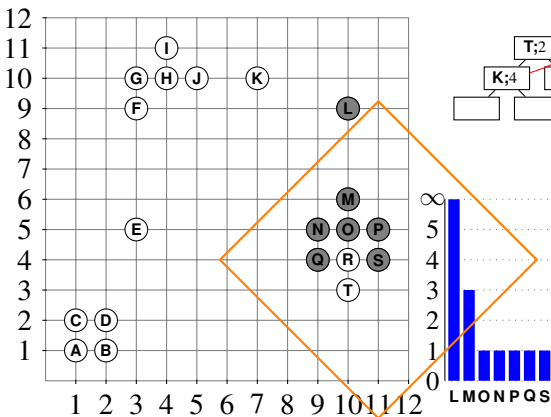
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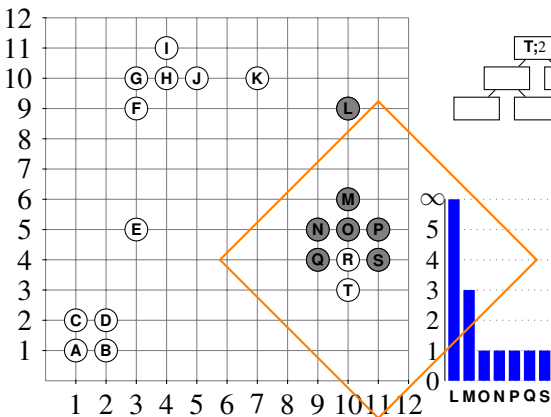
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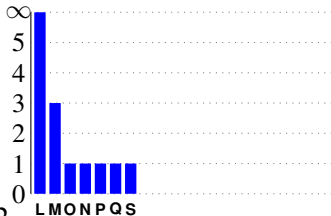
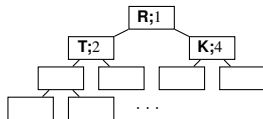
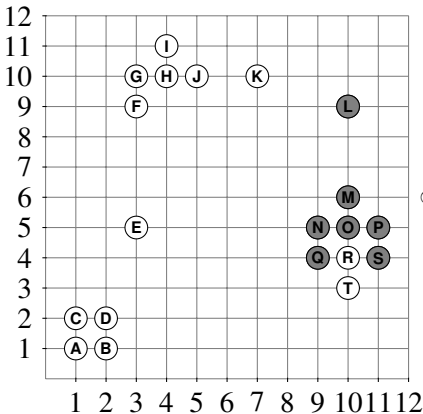
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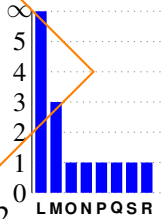
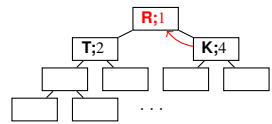
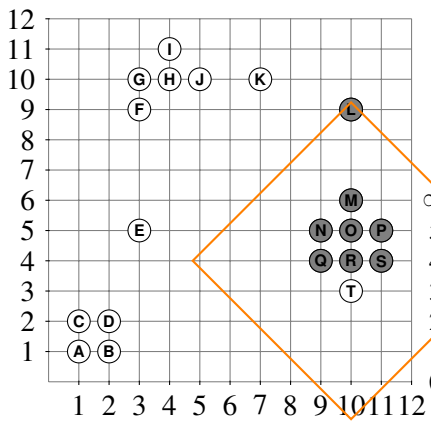


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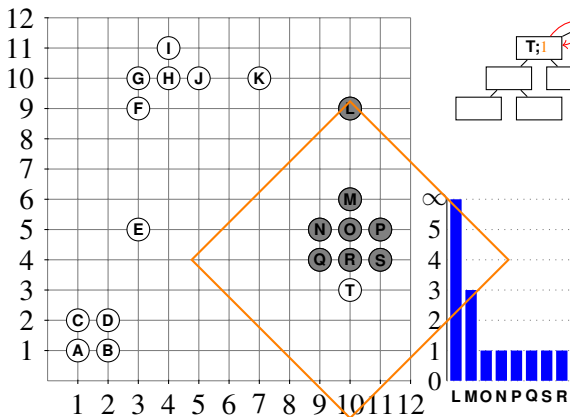
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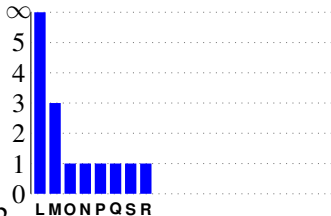
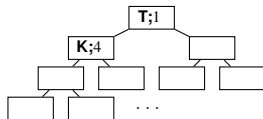
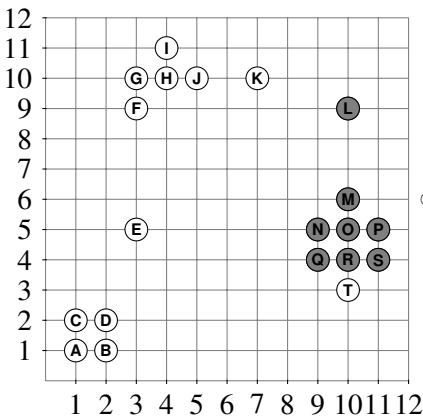
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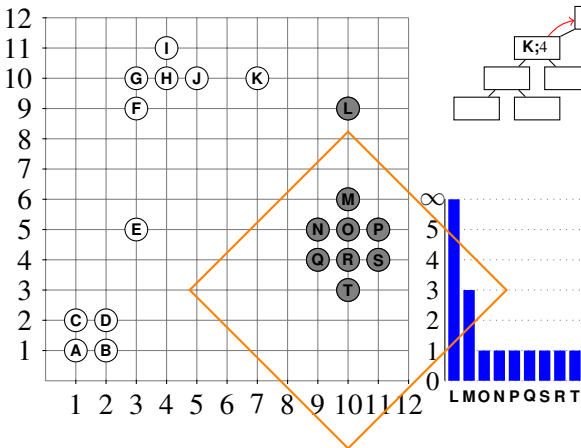
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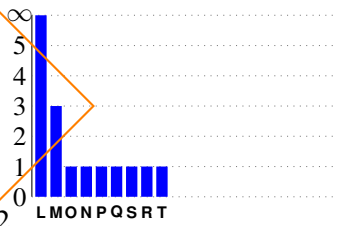
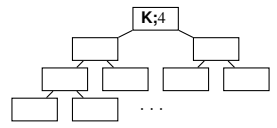
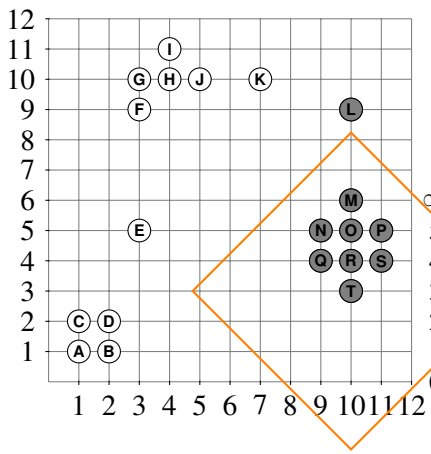


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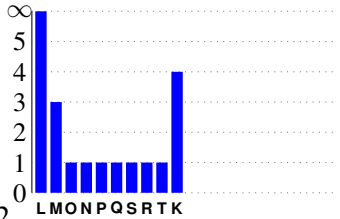
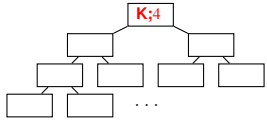
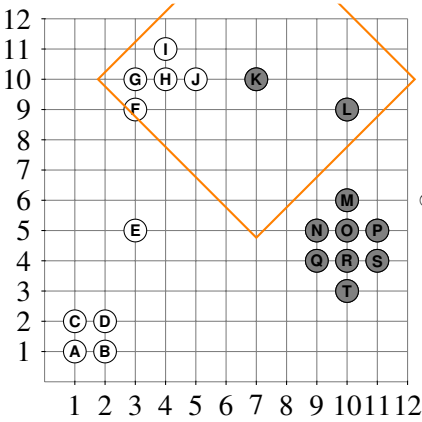


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$\epsilon = 5$,
minPts = 2

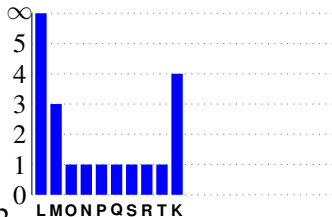
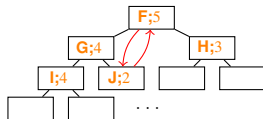
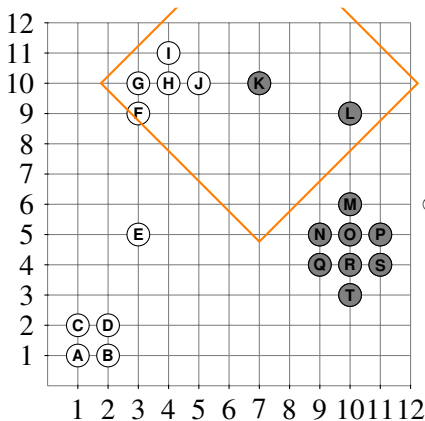
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

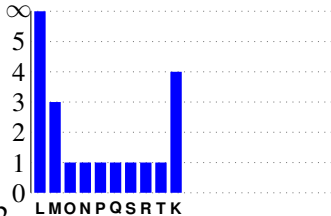
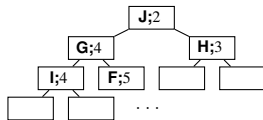
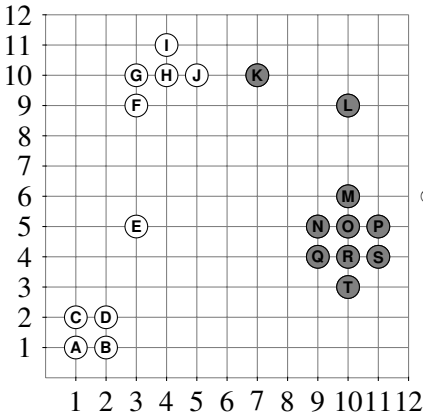
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

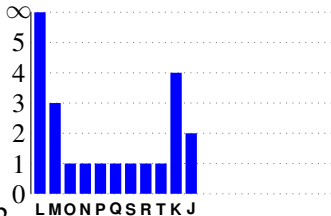
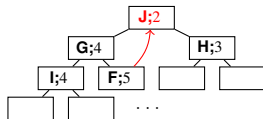
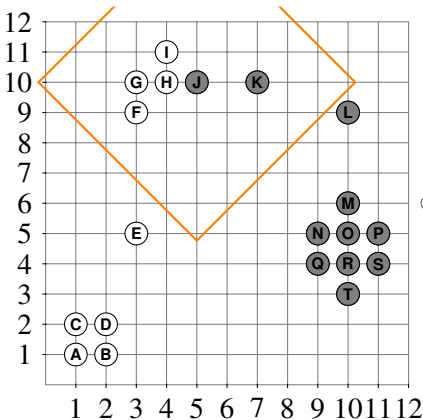
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

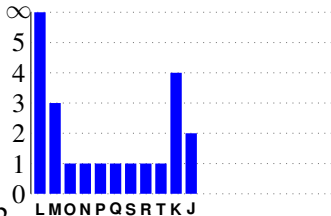
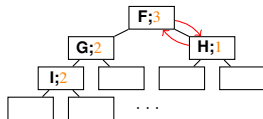
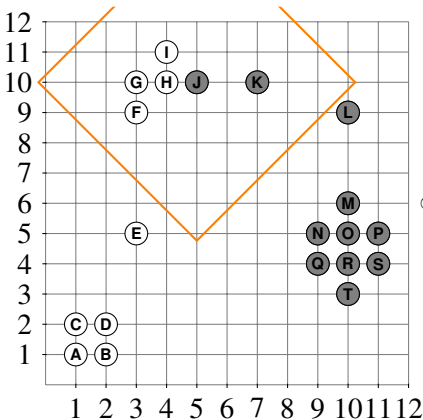
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

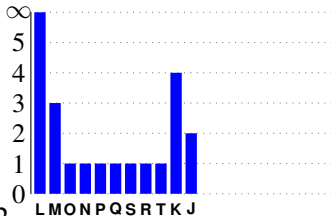
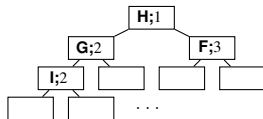
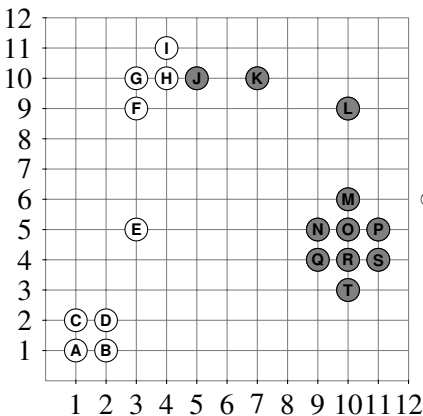
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

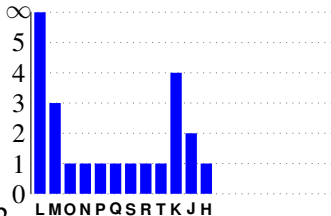
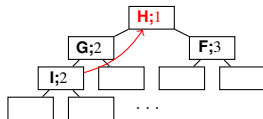
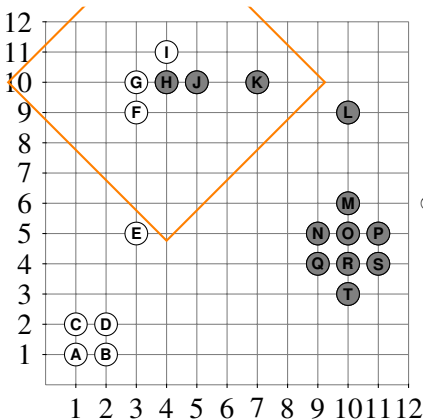
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

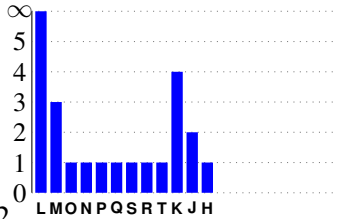
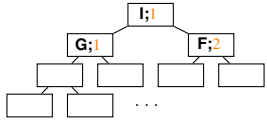
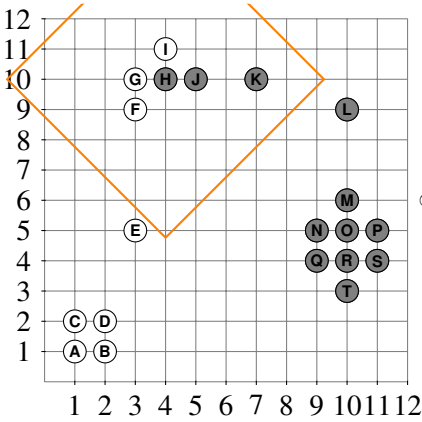


Aufgabe 8-1

- $\epsilon = 5,$
 $\text{minPts} = 2$
- $\epsilon = 5,$
 $\text{minPts} = 4$
- $\epsilon = 2,$
 $\text{minPts} = 4$
- Vergleich

Aufgabe 8-2

- DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

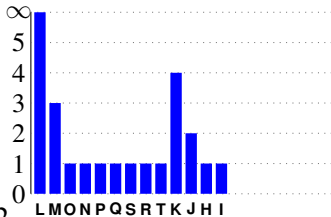
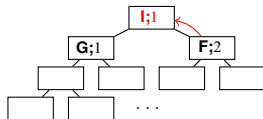
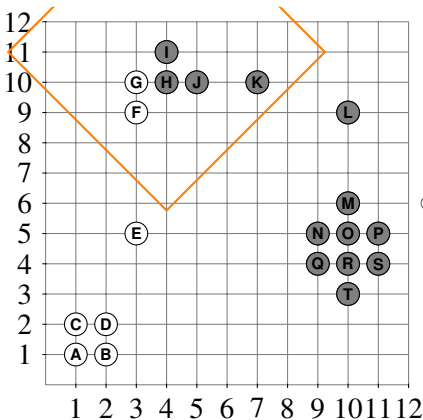
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

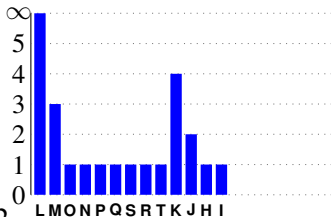
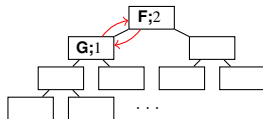
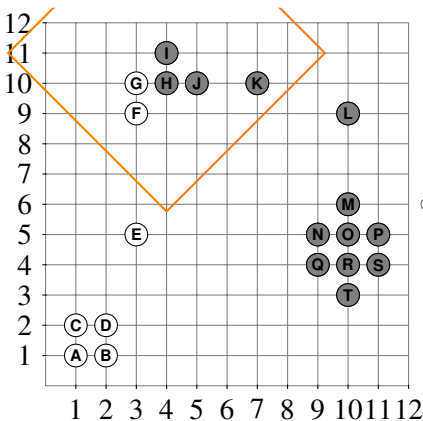
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

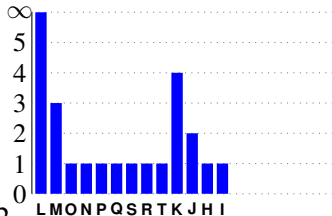
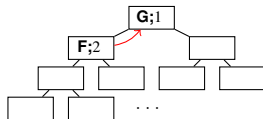
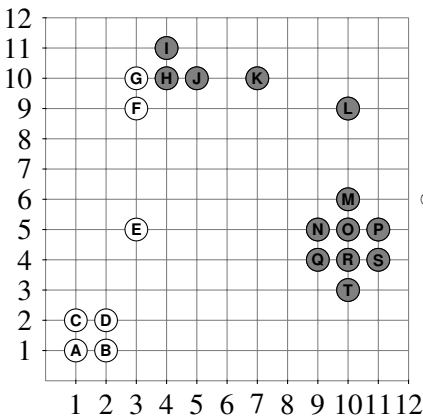
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

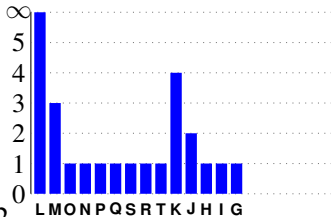
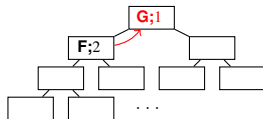
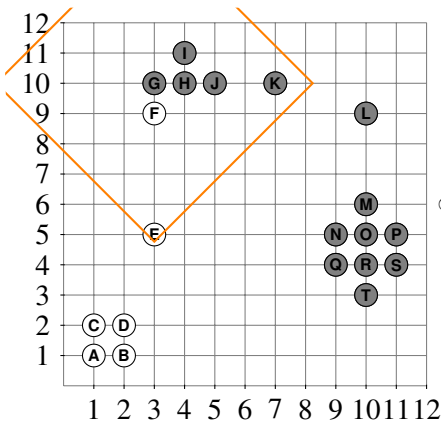
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

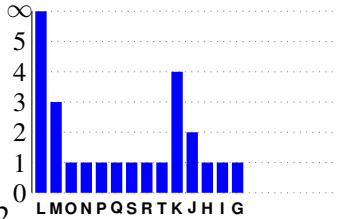
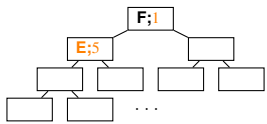
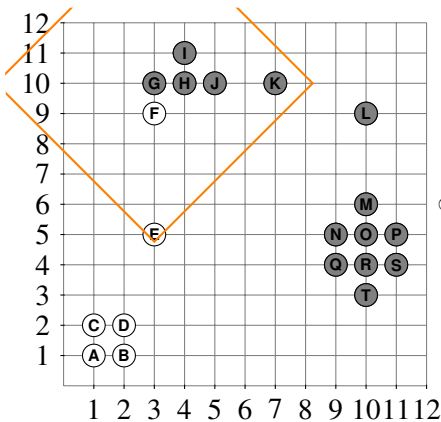
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

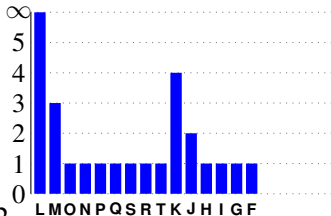
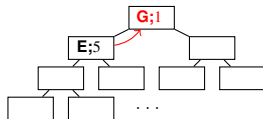
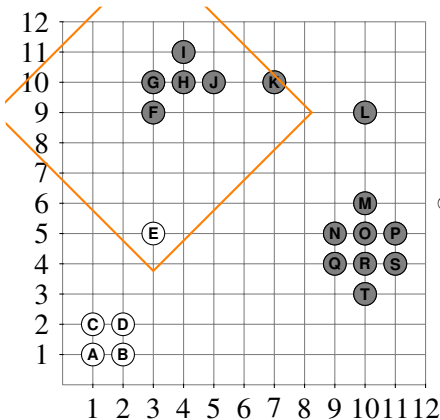
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

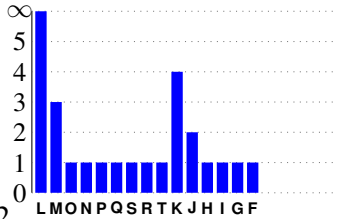
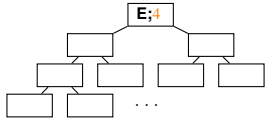
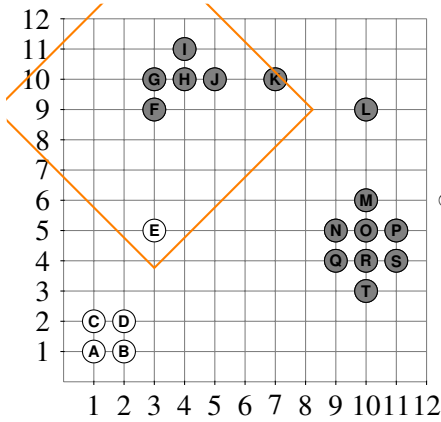


Aufgabe 8-1

- $\epsilon = 5,$
 $\text{minPts} = 2$
- $\epsilon = 5,$
 $\text{minPts} = 4$
- $\epsilon = 2,$
 $\text{minPts} = 4$
- Vergleich

Aufgabe 8-2

- DBSCAN und
Single-Link

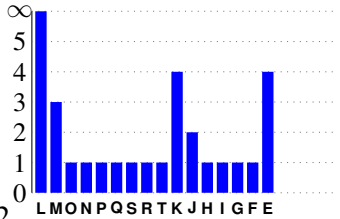
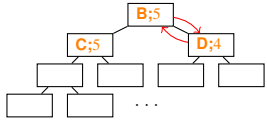
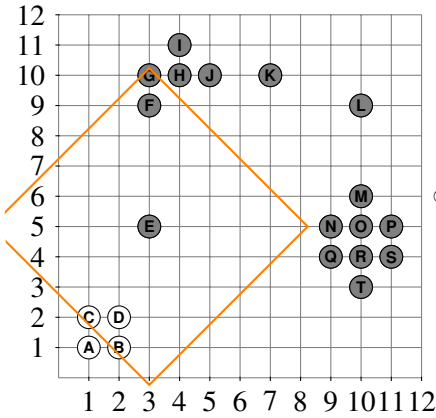


Aufgabe 8-1

- $\epsilon = 5$,
minPts = 2
- $\epsilon = 5$,
minPts = 4
- $\epsilon = 2$,
minPts = 4
- Vergleich

Aufgabe 8-2

- DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

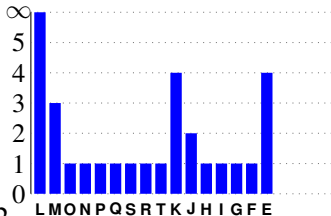
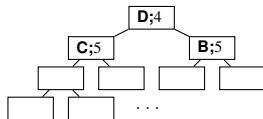
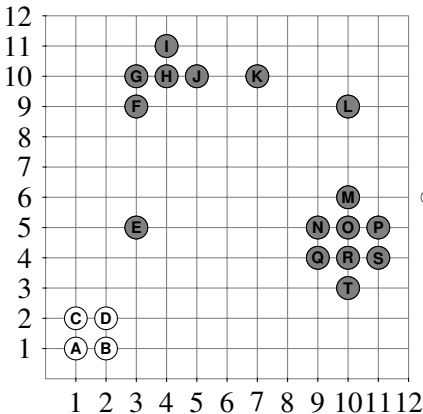
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

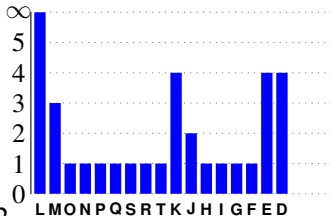
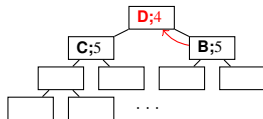
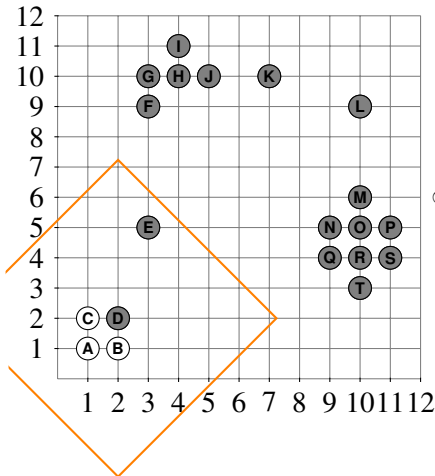
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

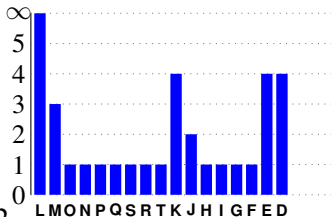
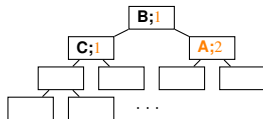
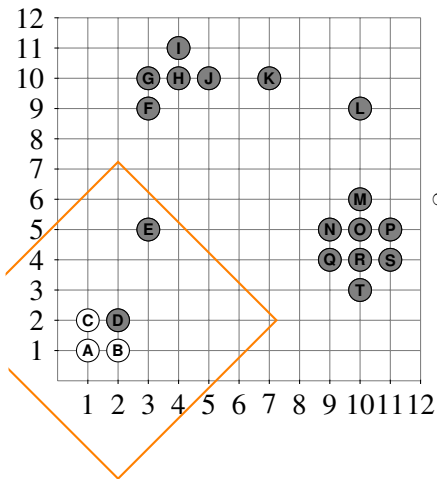
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

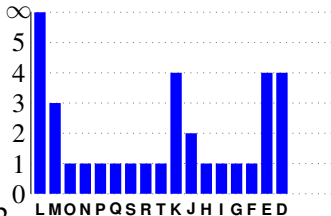
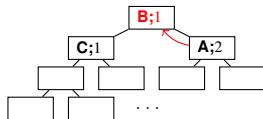
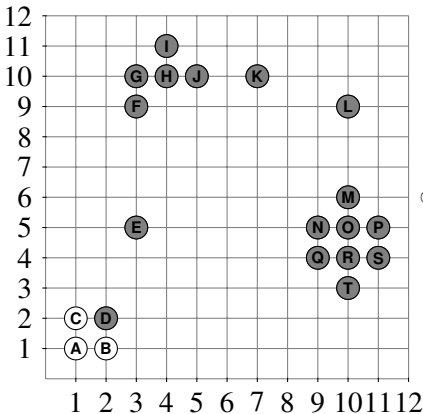
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

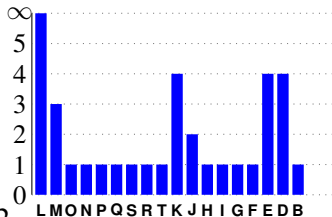
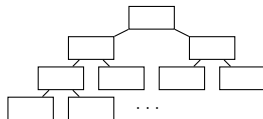
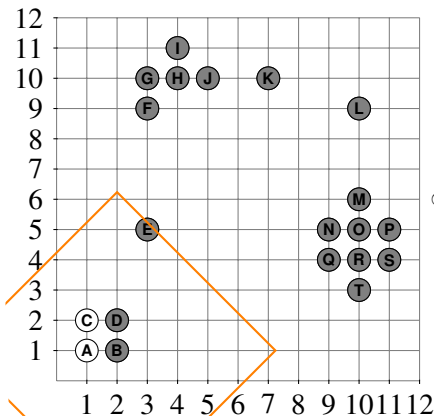
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

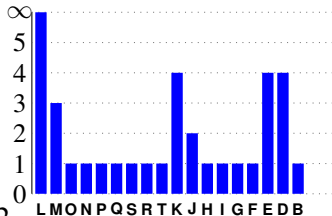
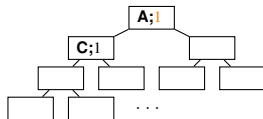
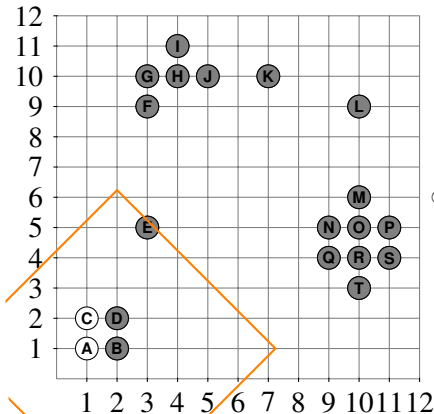
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

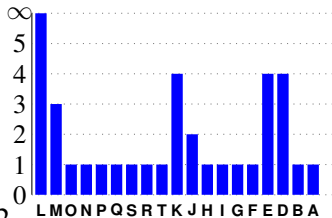
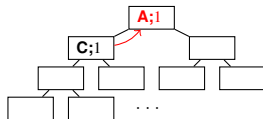
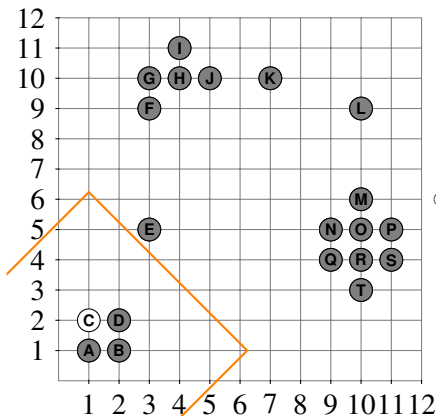
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

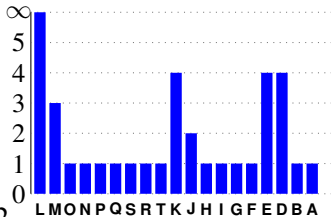
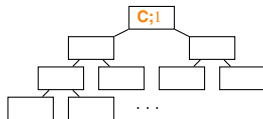
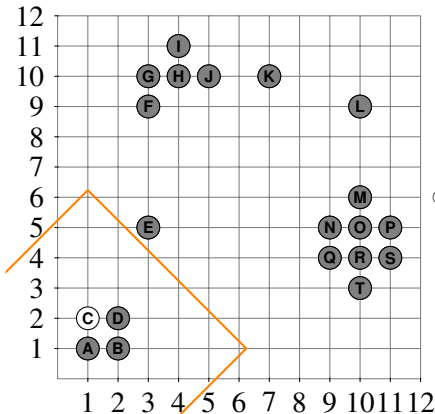
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

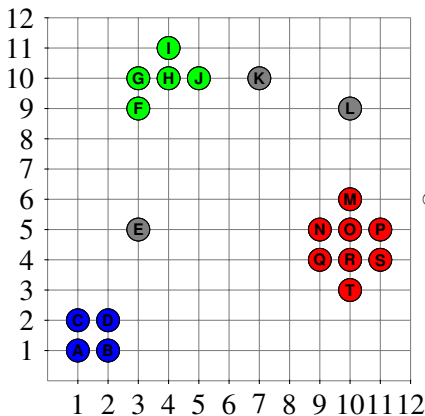
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minPts = 4

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minPts = 4

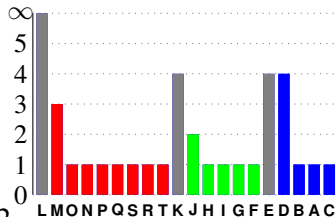
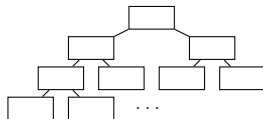
Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



(Intuitive Cluster \approx Täler)



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

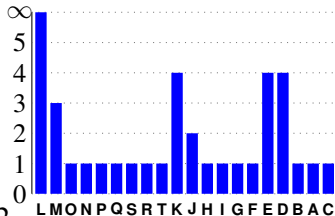
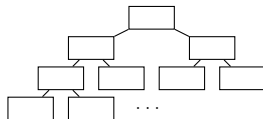
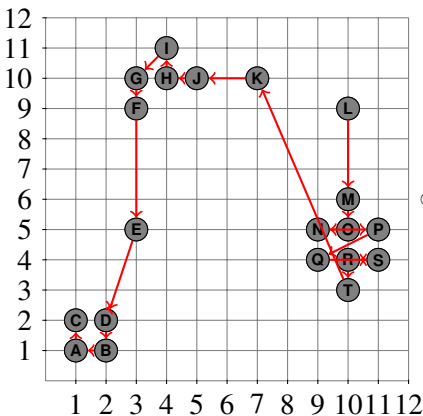
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



(Clusterordnung als Graph: springt!)

Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

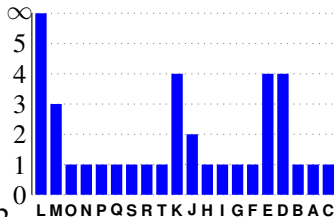
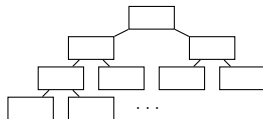
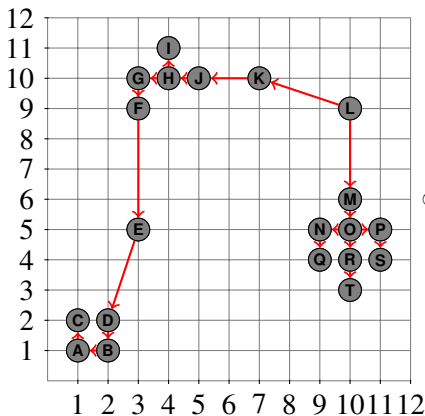
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



("Erreicht von" Graph: \approx Spanning Tree)

Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

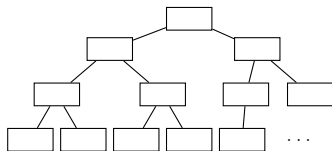
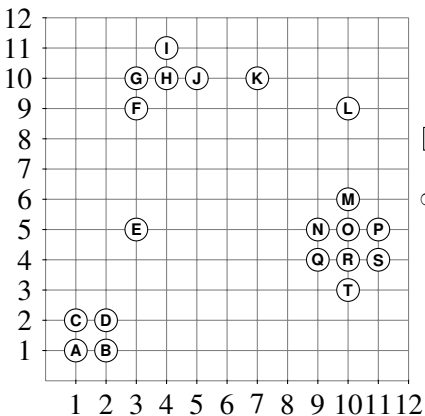
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

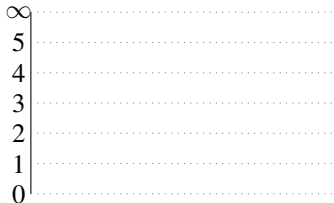
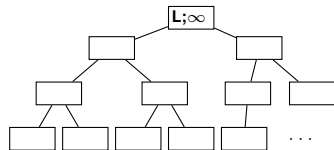
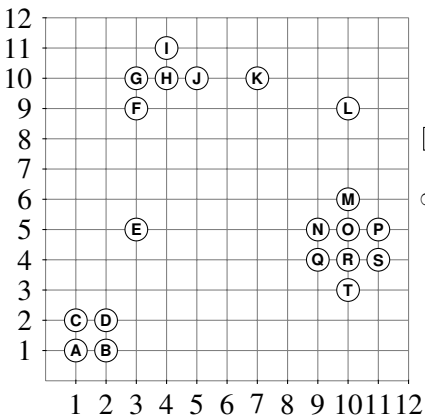
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

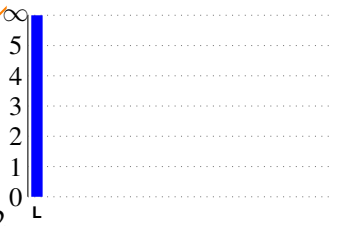
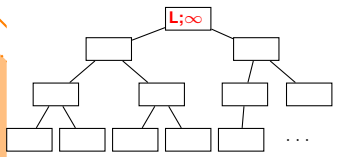
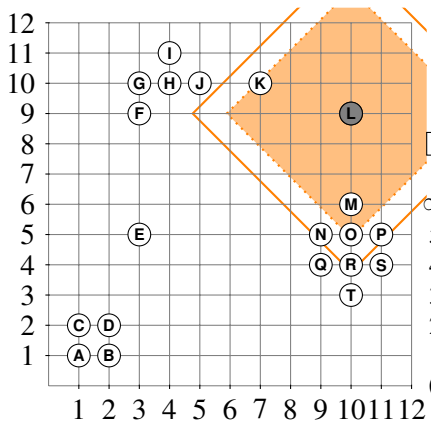


Aufgabe 8-1

- $\epsilon = 5,$
 $\text{minPts} = 2$
- $\epsilon = 5,$
 $\text{minPts} = 4$
- $\epsilon = 2,$
 $\text{minPts} = 4$
- Vergleich

Aufgabe 8-2

- DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

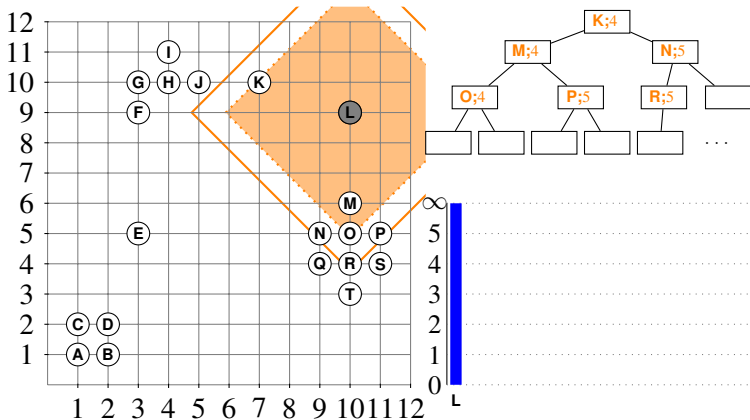
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

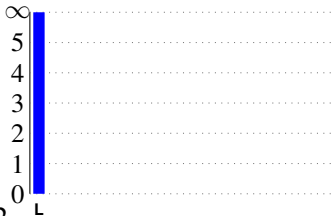
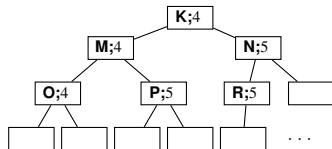
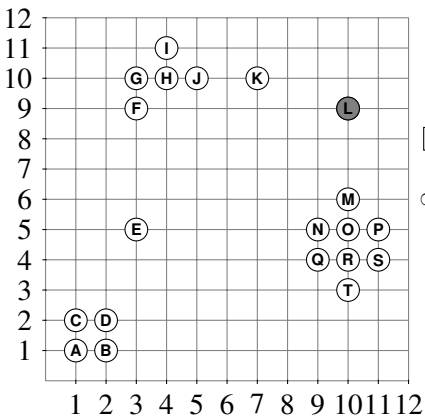
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

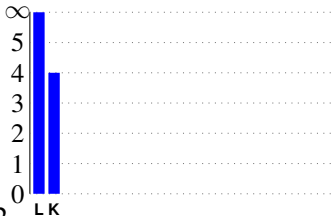
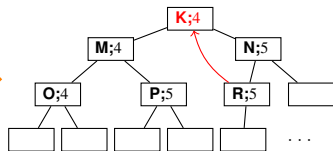
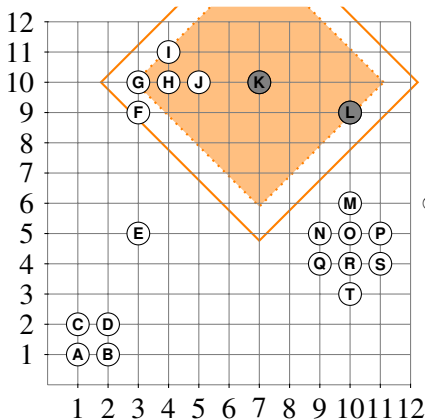
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

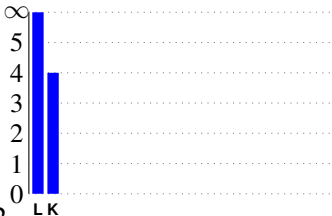
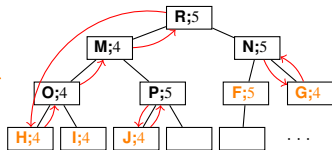
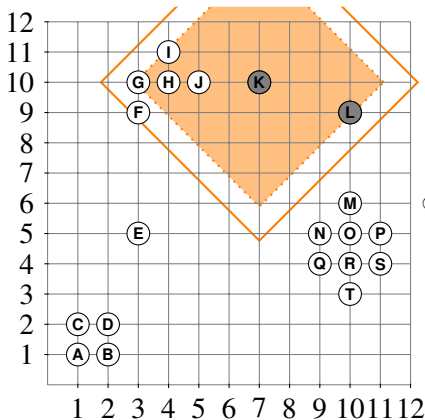
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

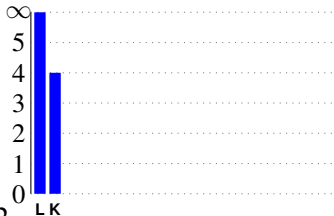
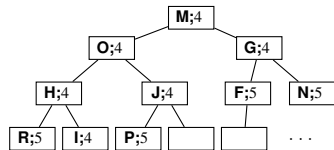
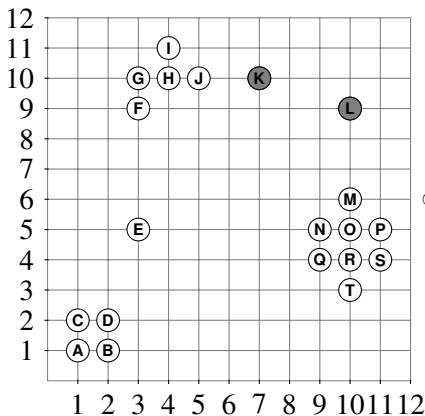
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

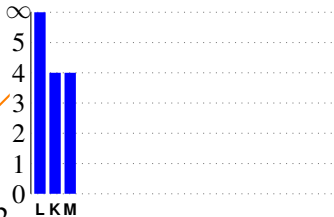
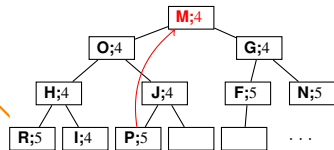
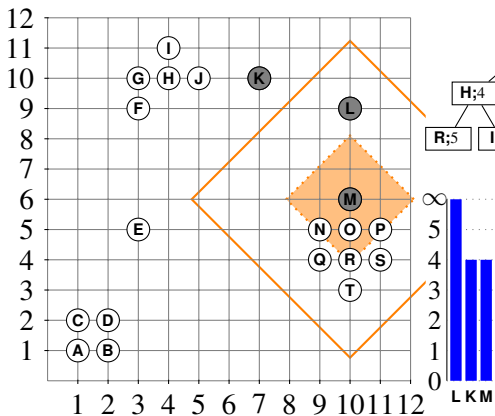
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

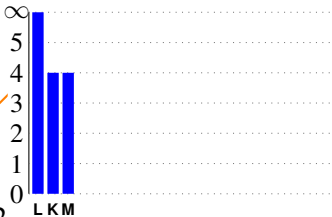
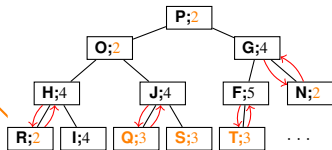
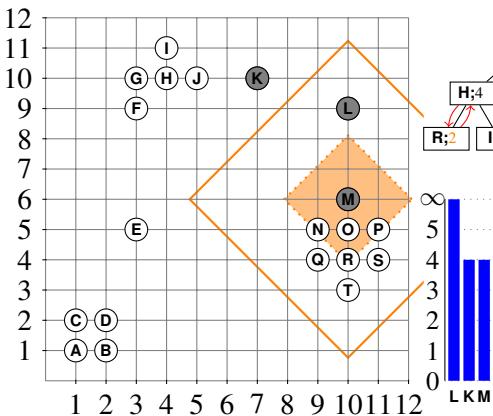
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

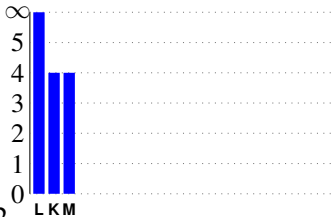
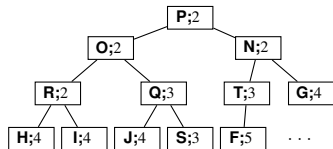
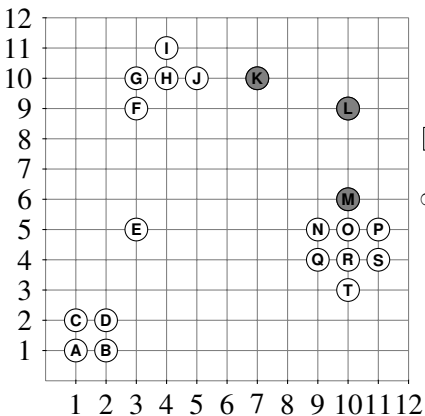
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

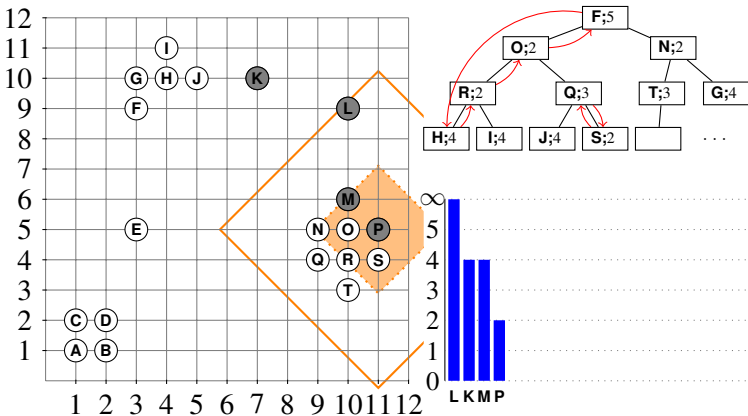
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

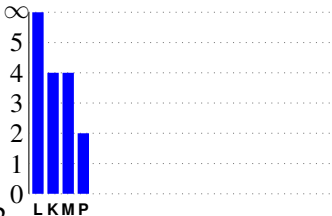
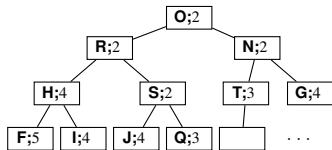
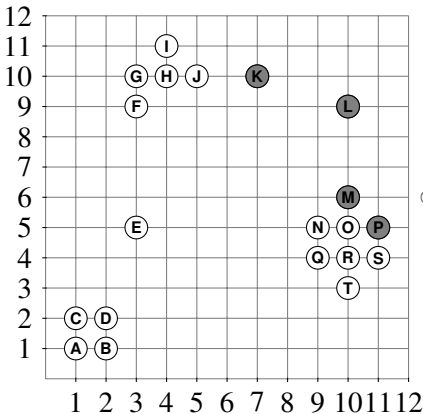
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

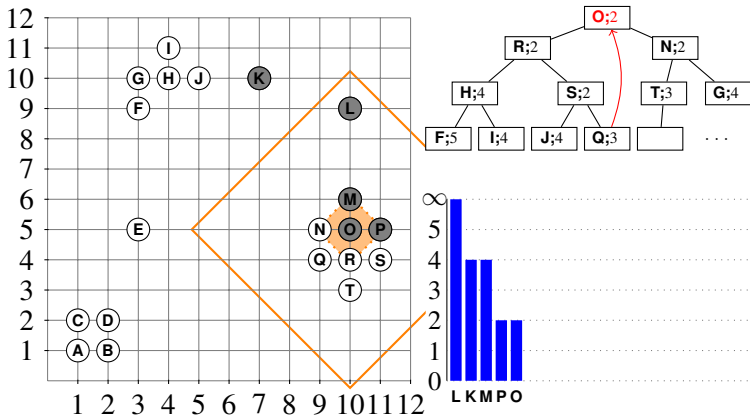
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

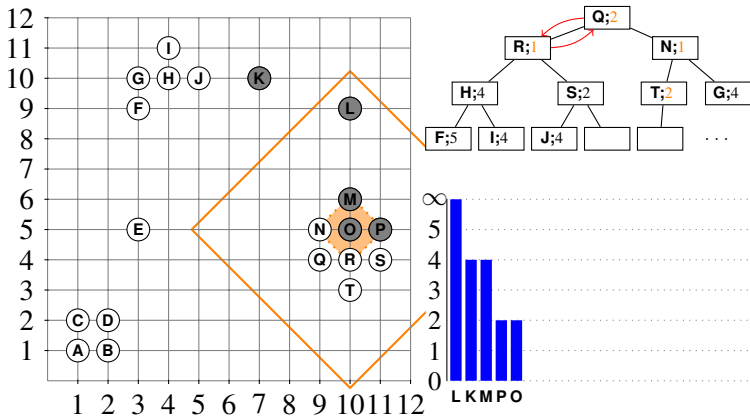
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

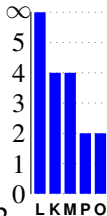
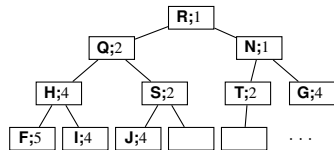
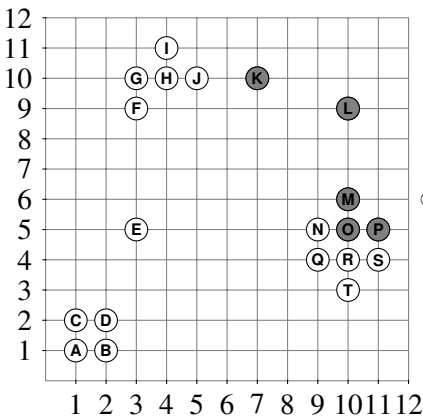
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

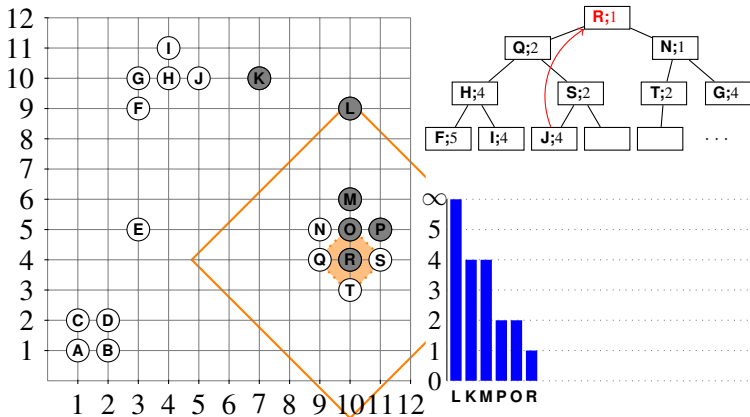
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

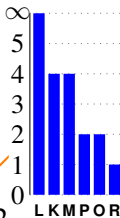
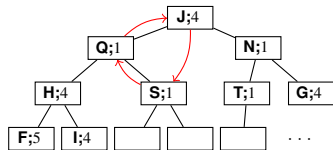
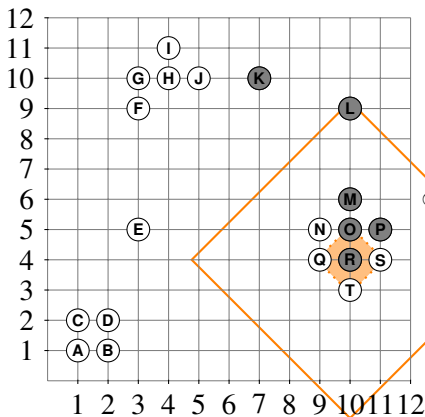
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minPts = 2

$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4
Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

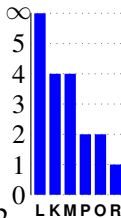
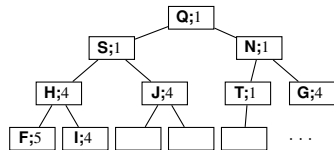
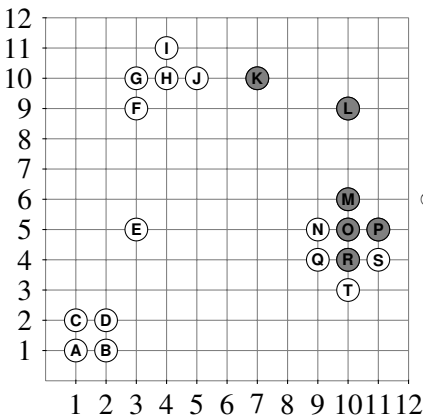
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

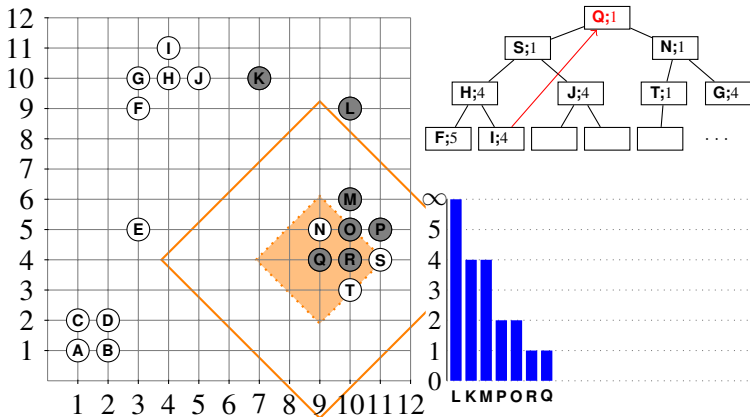
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

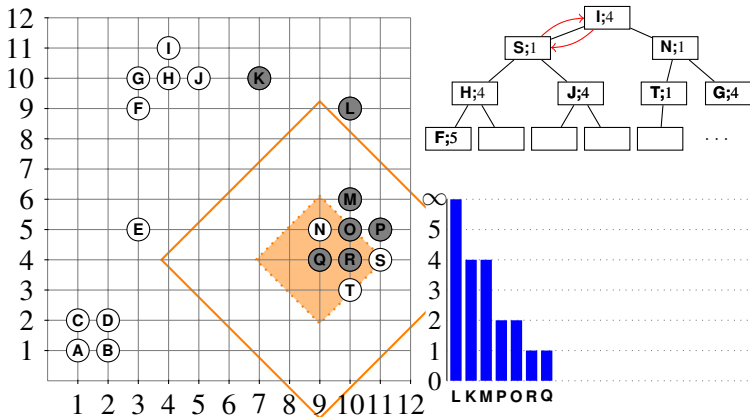
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

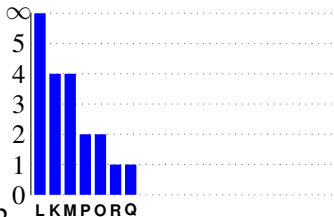
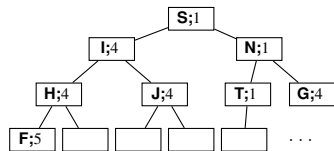
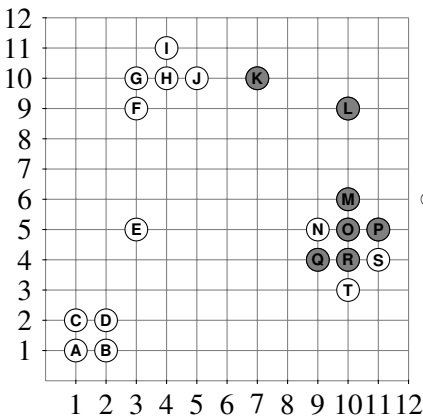
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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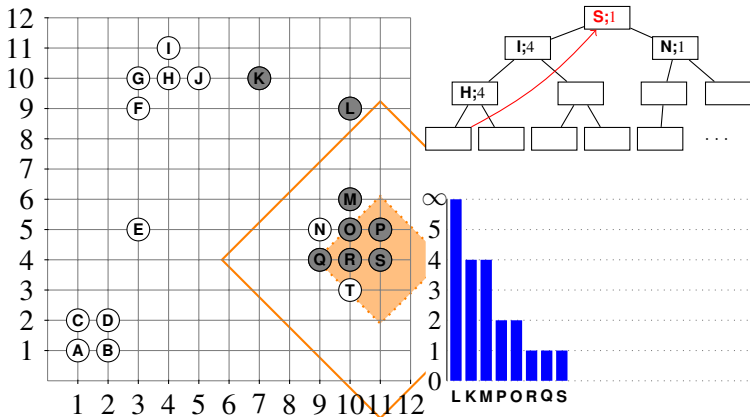
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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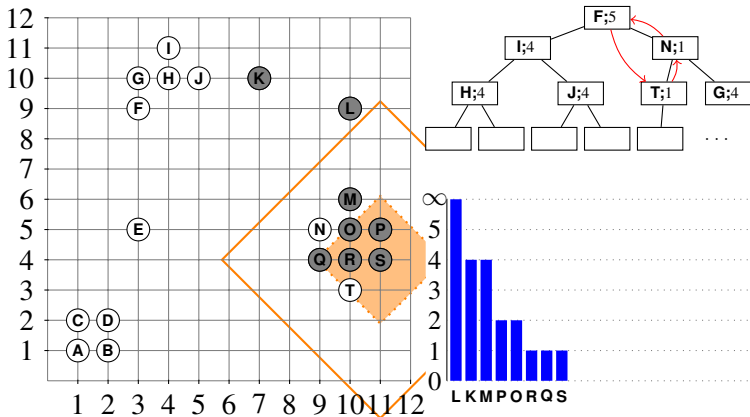
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

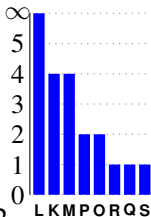
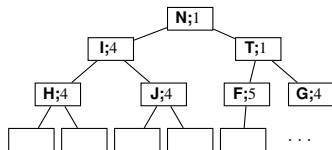
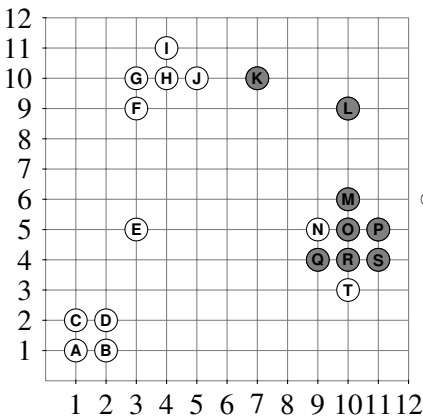
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
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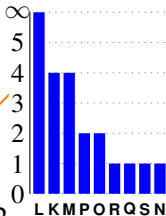
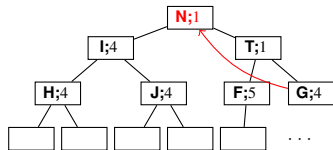
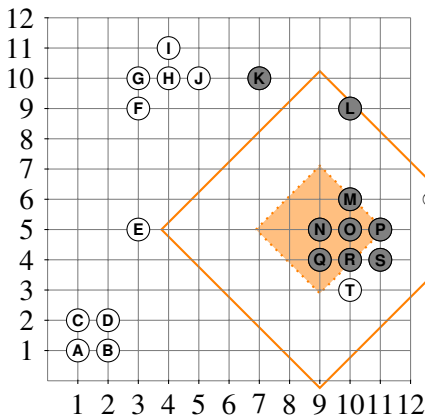
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

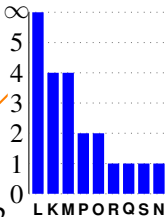
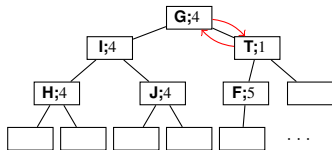
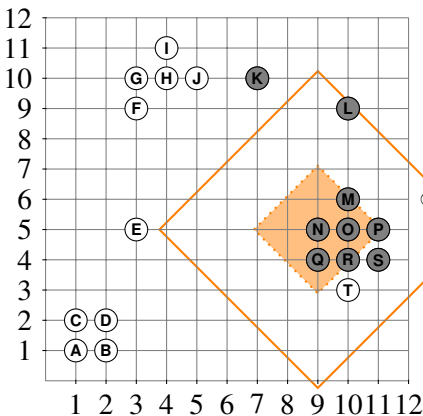
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

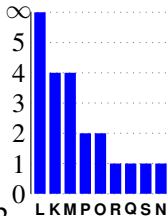
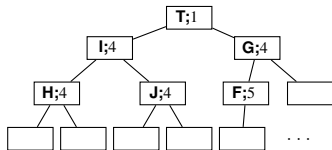
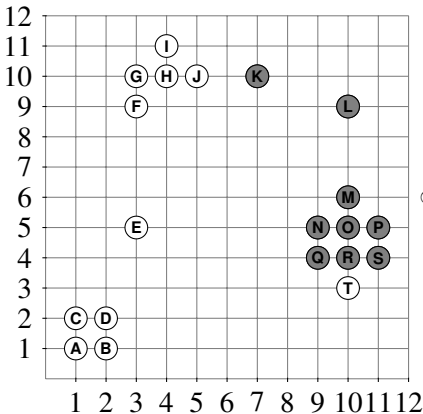
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

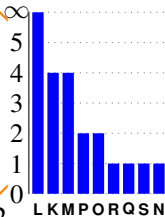
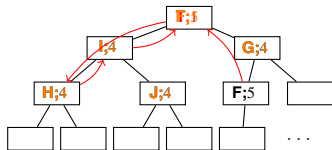
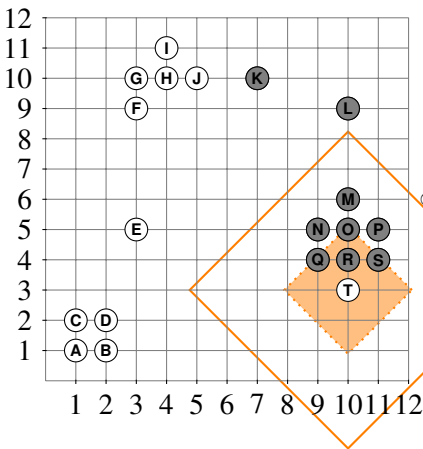
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

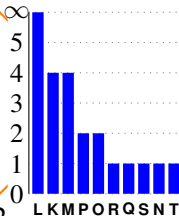
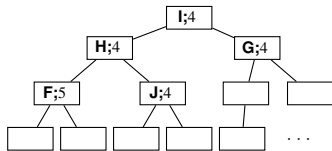
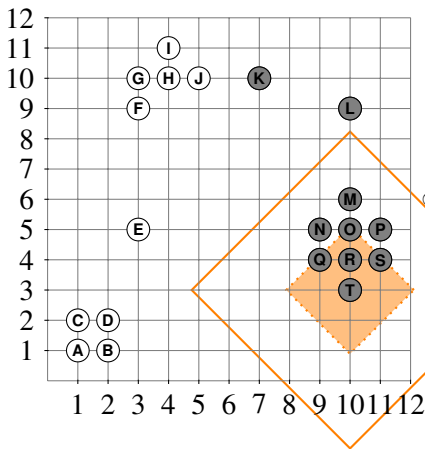
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

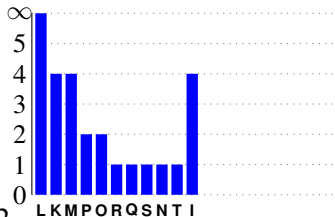
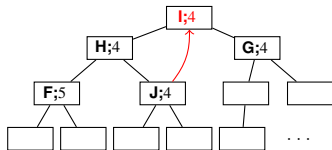
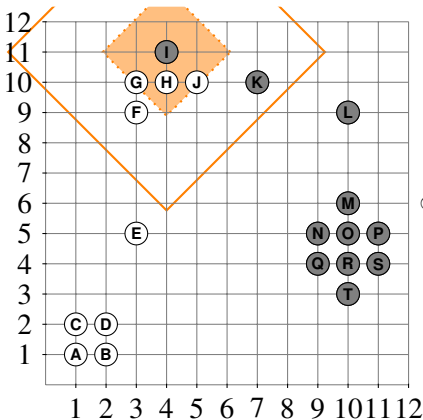
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

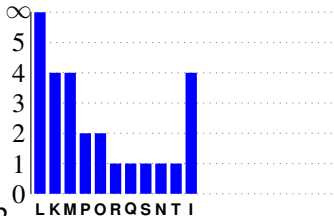
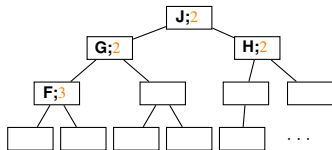
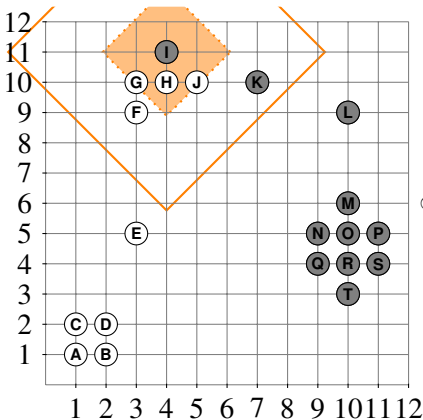
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

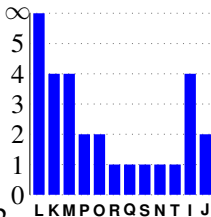
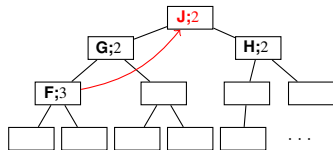
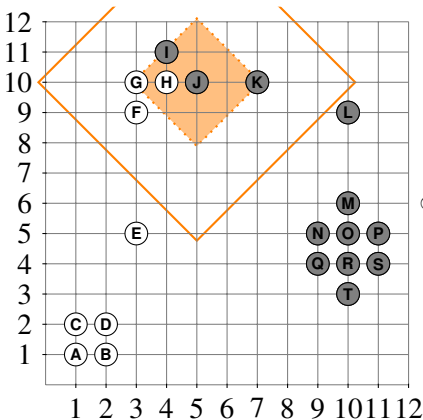
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

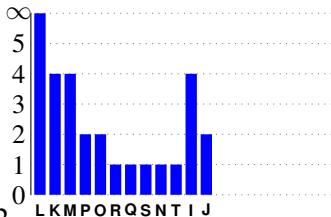
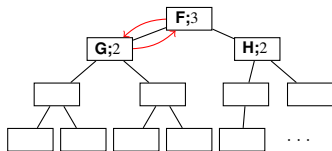
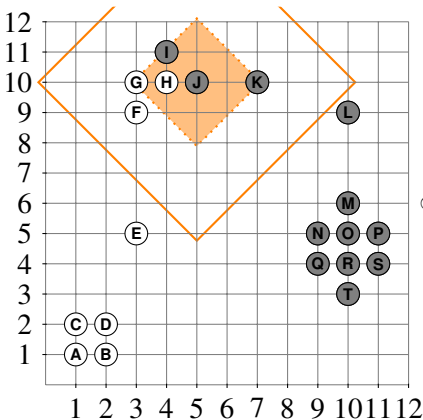
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

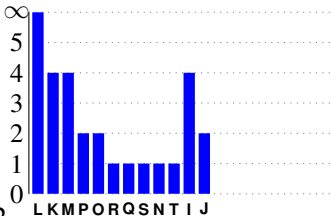
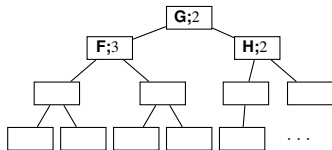
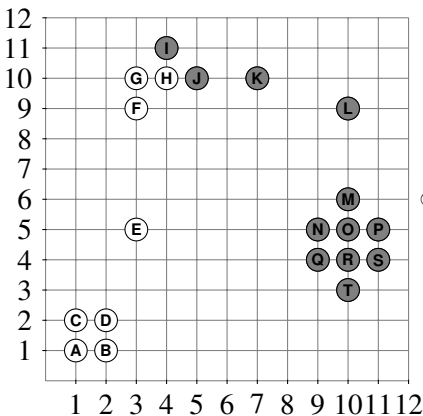
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

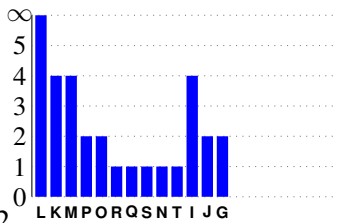
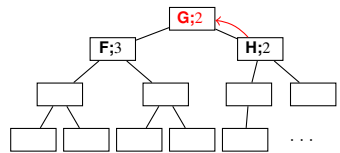
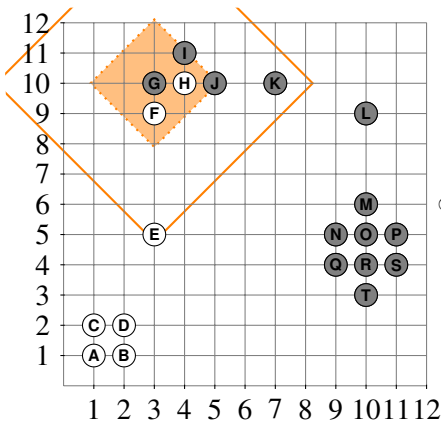
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

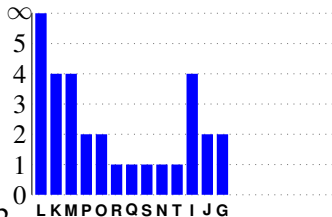
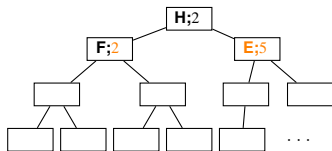
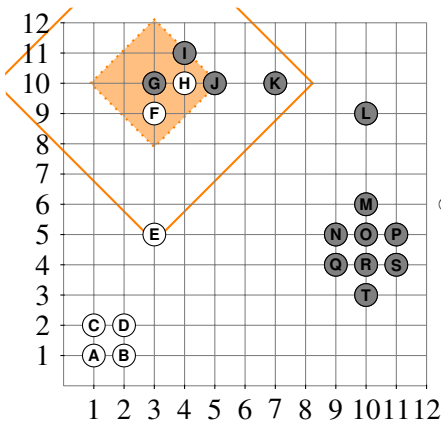
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

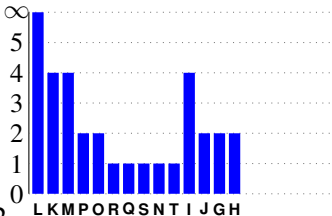
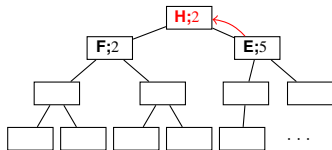
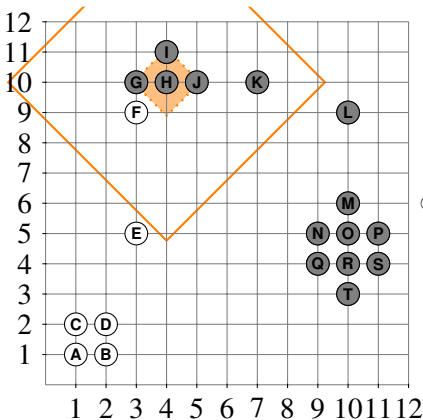
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

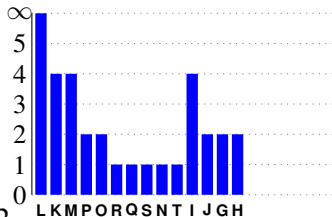
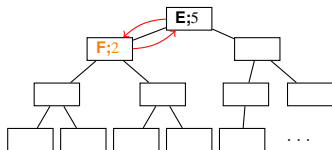
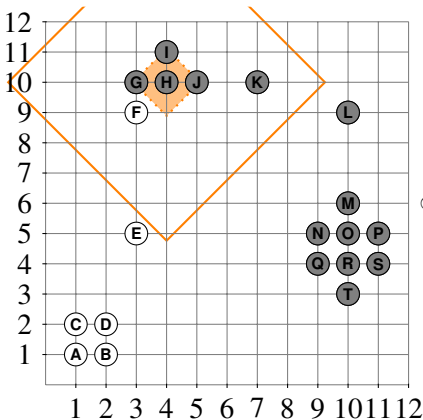
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

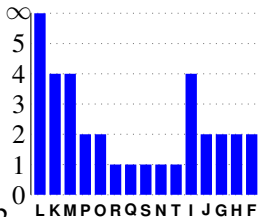
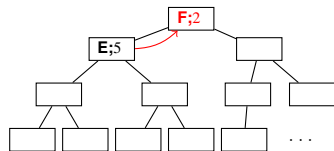
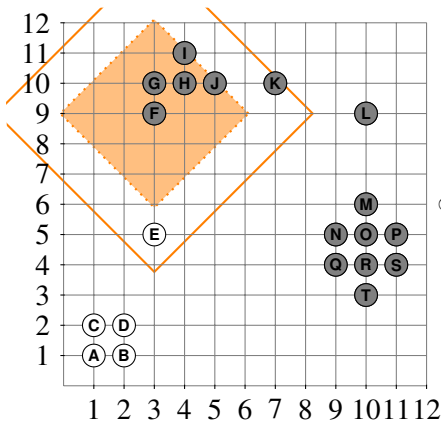
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

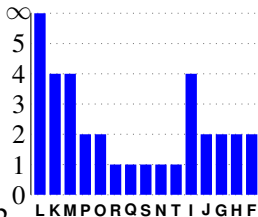
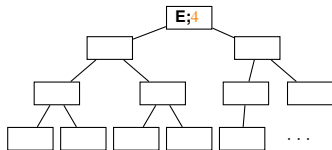
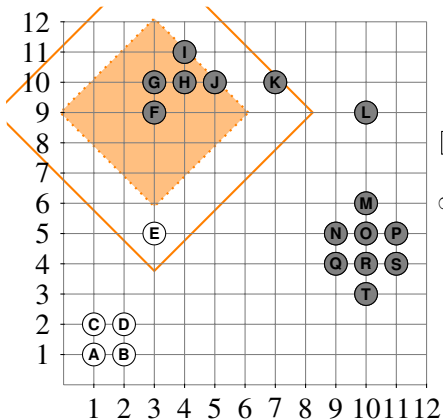
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

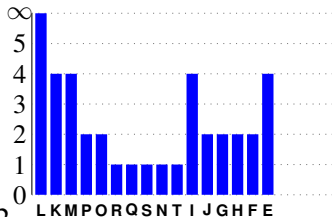
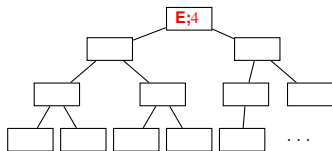
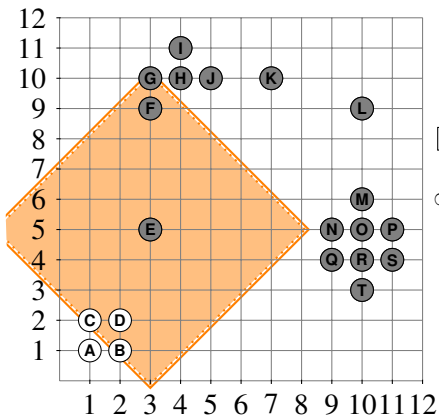
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

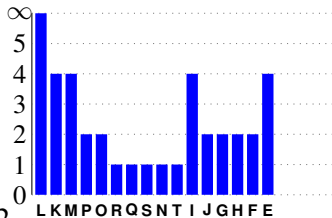
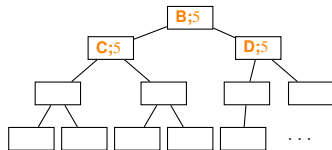
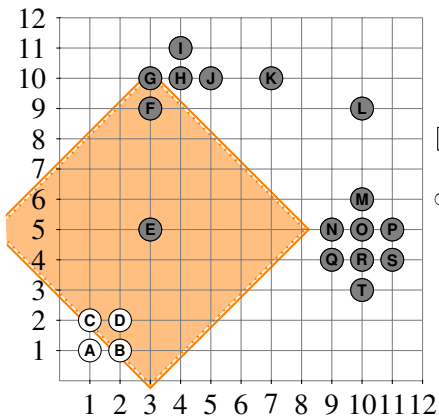
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

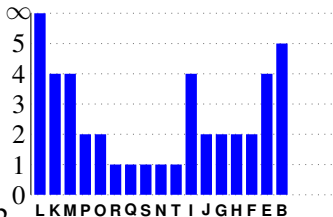
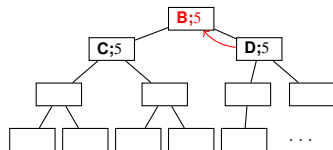
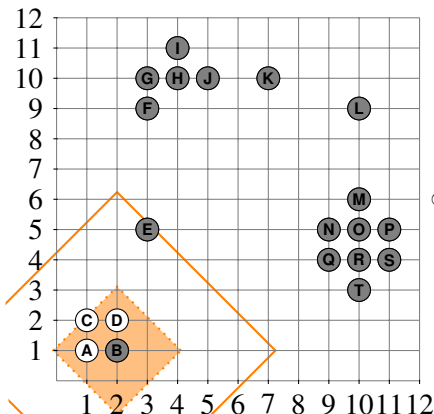
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

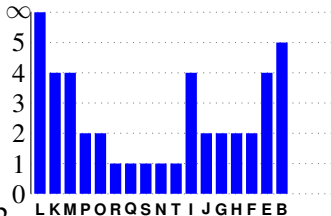
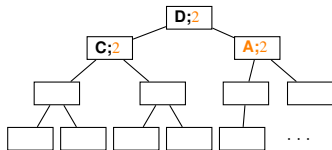
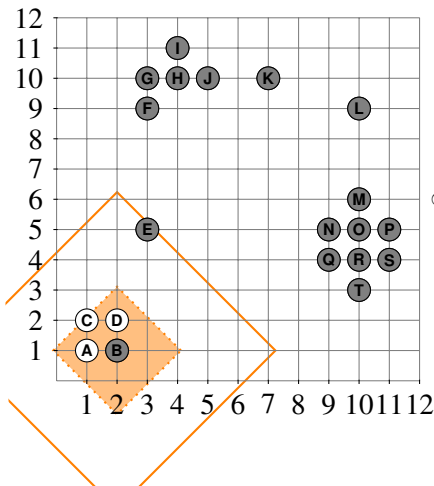
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

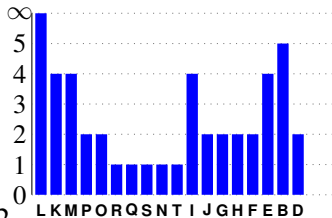
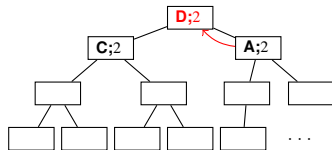
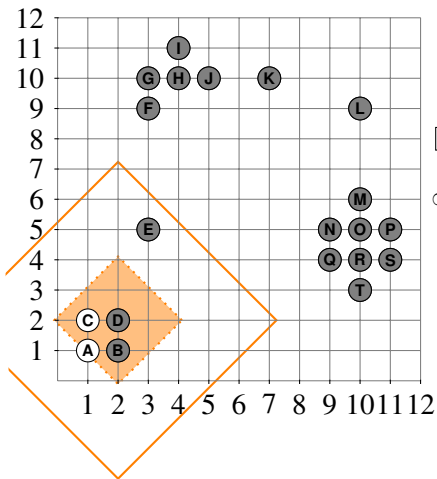
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

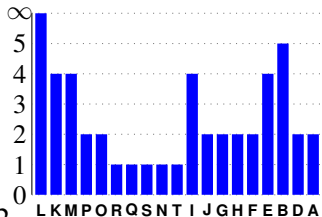
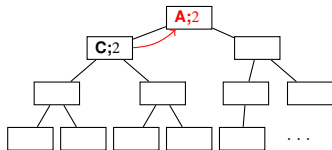
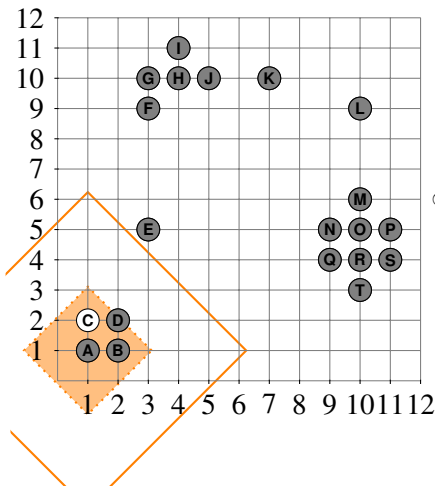
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

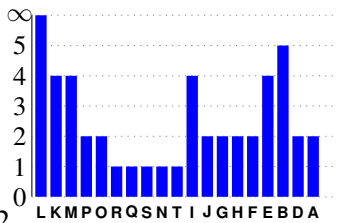
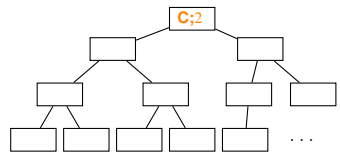
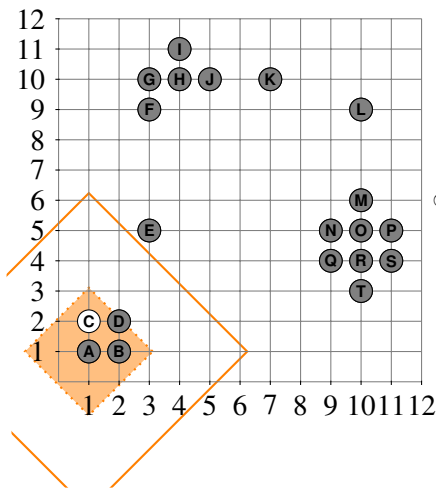


Aufgabe 8-1

- $\epsilon = 5,$
 $\text{minPts} = 2$
- $\epsilon = 5,$
 $\text{minPts} = 4$
- $\epsilon = 2,$
 $\text{minPts} = 4$
- Vergleich

Aufgabe 8-2

- DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

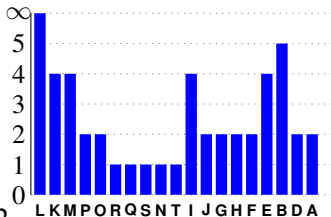
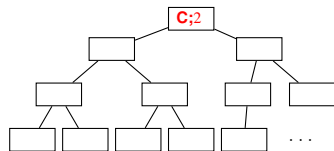
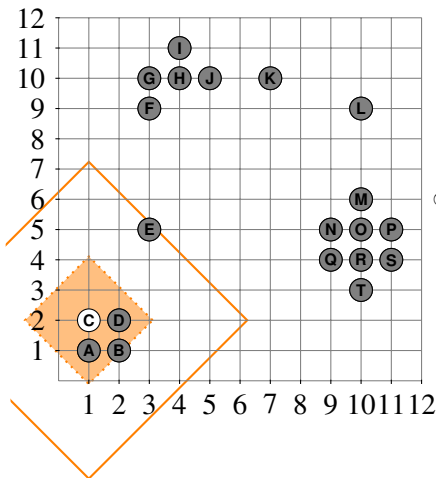
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

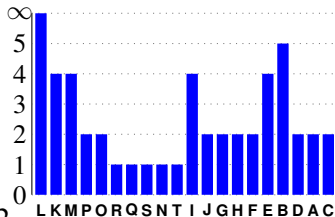
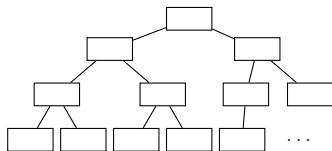
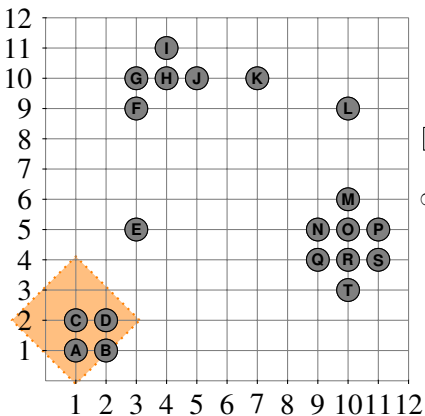
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

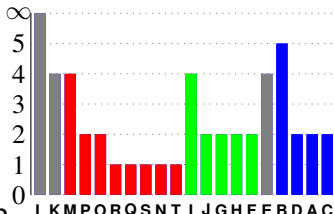
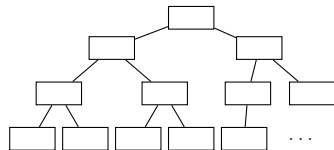
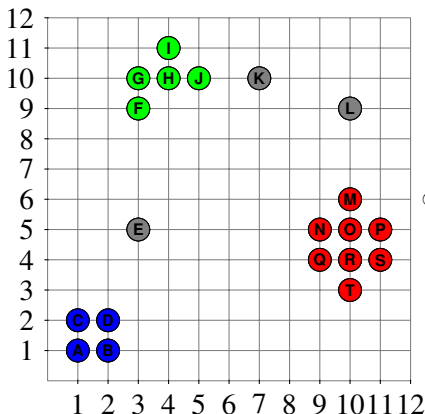
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



(Intuitive Cluster \approx Täler)

Anfang ("Eingang") gehört i.d.R. dazu, Ende nicht!

Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

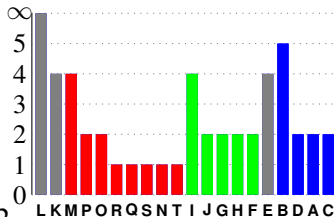
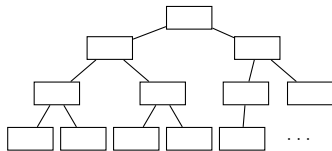
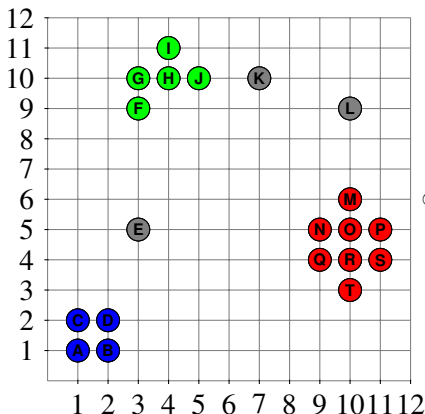
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Plot ist stärker geglättet!

Heap zufälligerweise etwas teurer (nicht zwangsläufig!)

Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

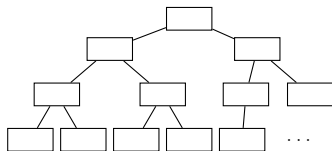
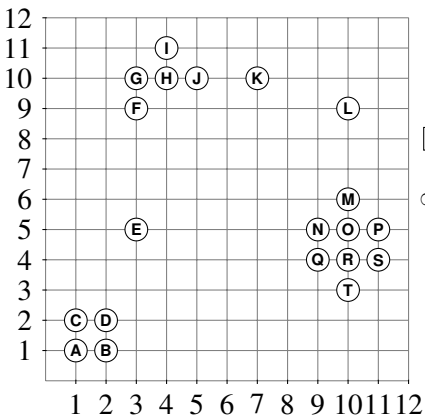
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5,$
 $\text{minPts} = 2$

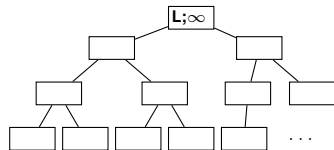
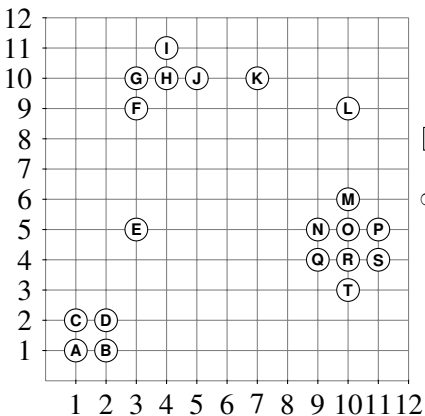
$\epsilon = 5,$
 $\text{minPts} = 4$

$\epsilon = 2,$
 $\text{minPts} = 4$

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

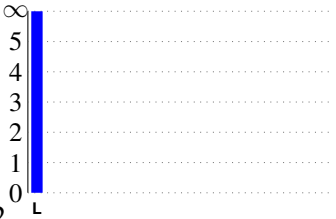
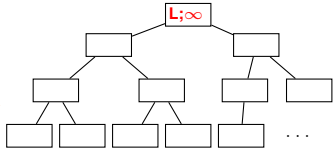
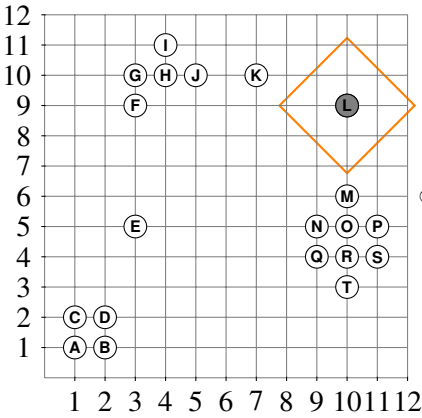
$\epsilon = 5$,
minPts = 2

$\epsilon = 5$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

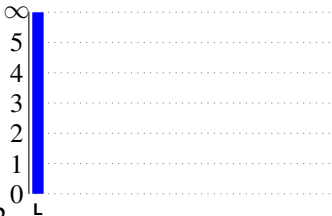
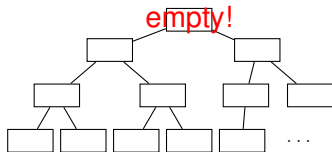
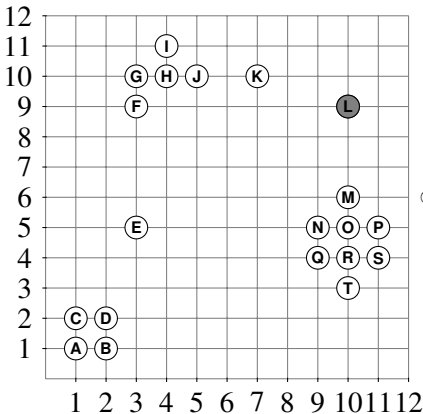
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

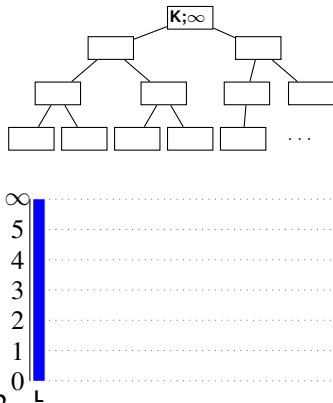
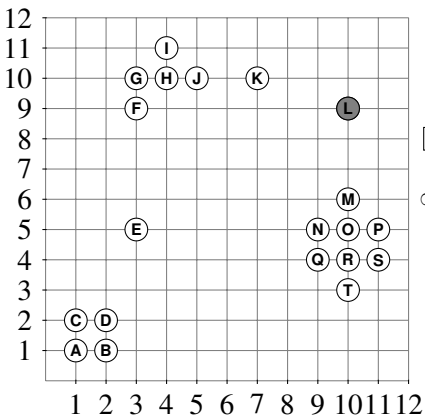
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

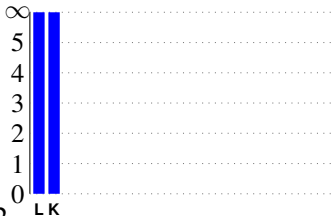
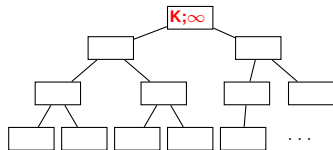
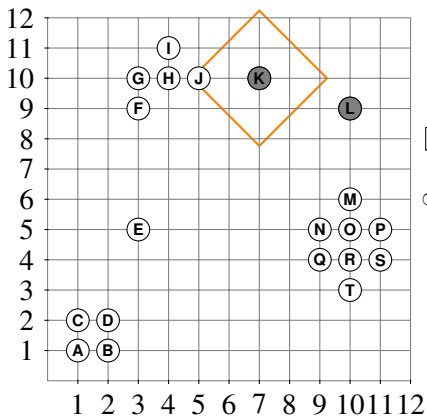
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

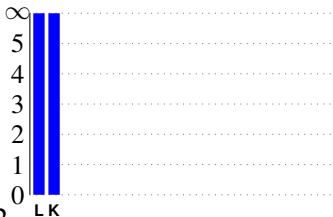
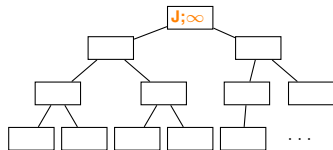
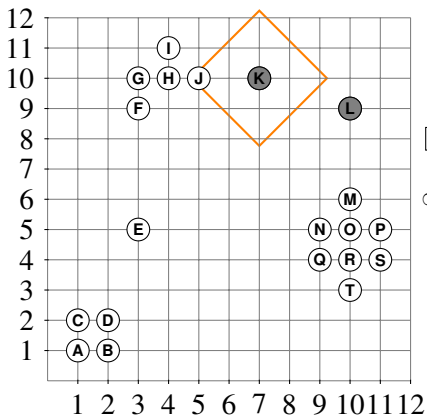
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

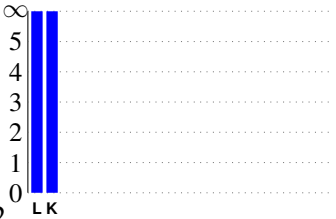
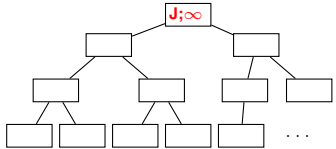
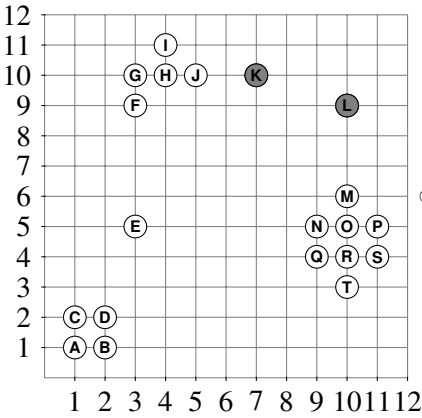
$\epsilon = 5,$
 $\text{minPts} = 2$

$\epsilon = 5,$
 $\text{minPts} = 4$

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

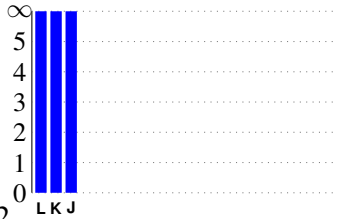
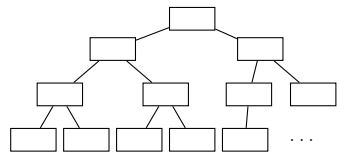
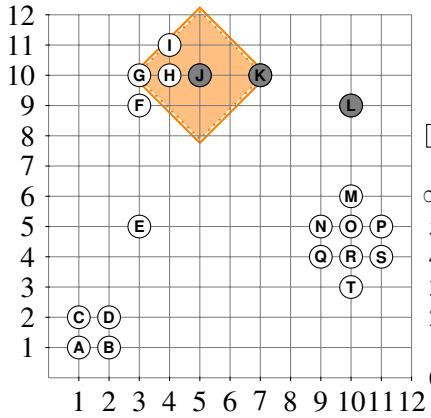
$\epsilon = 5,$
 $\text{minPts} = 2$

$\epsilon = 5,$
 $\text{minPts} = 4$

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

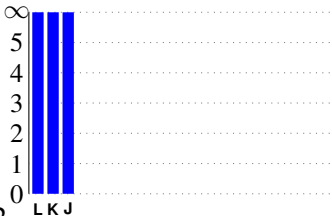
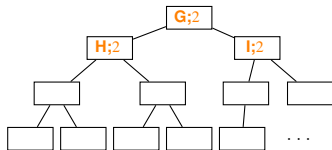
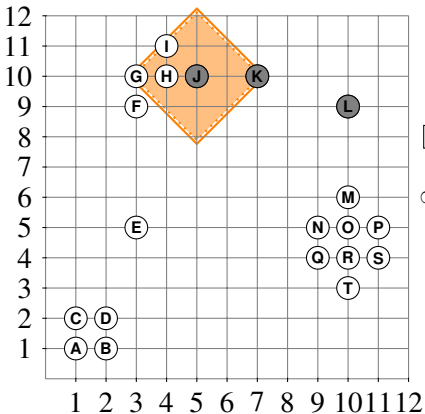
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

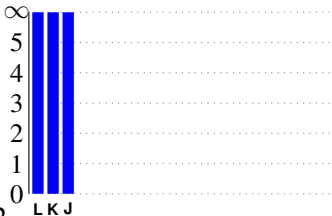
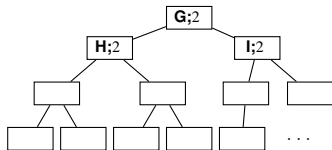
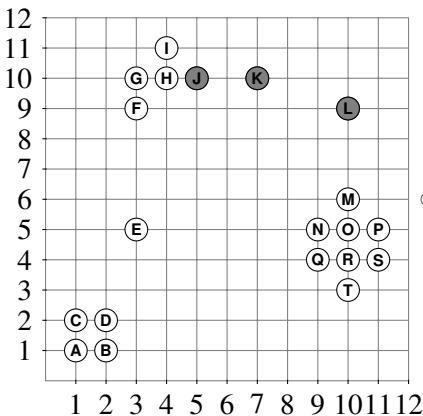
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

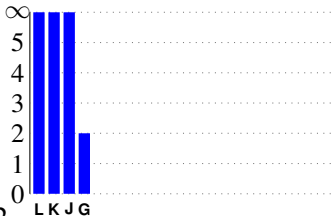
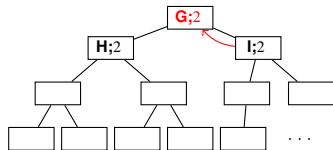
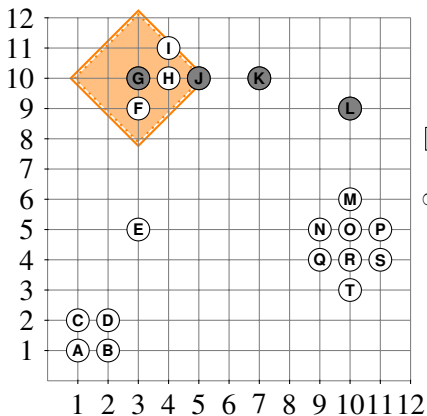
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

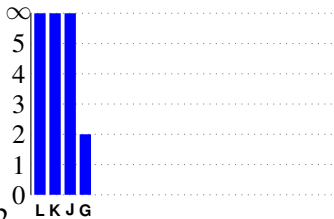
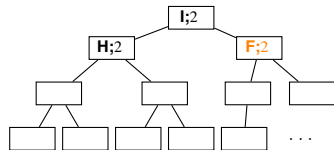
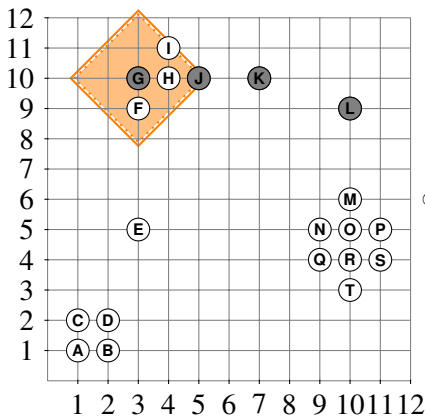
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

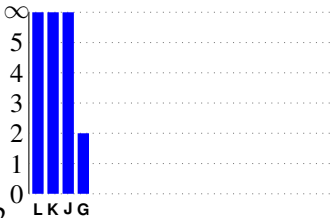
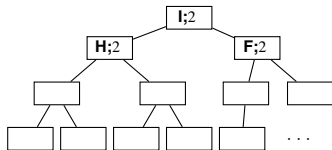
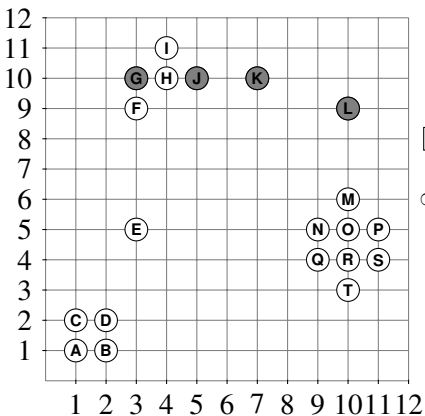
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

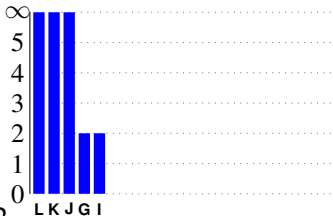
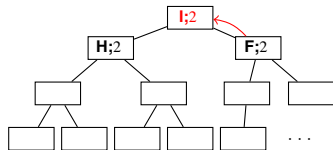
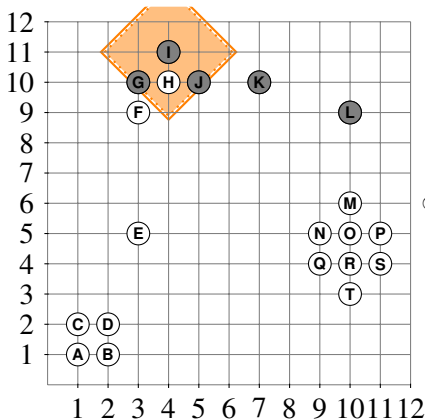
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

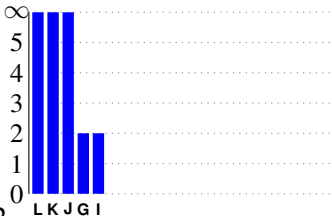
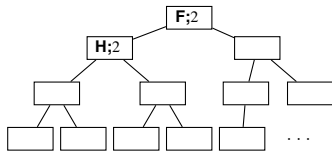
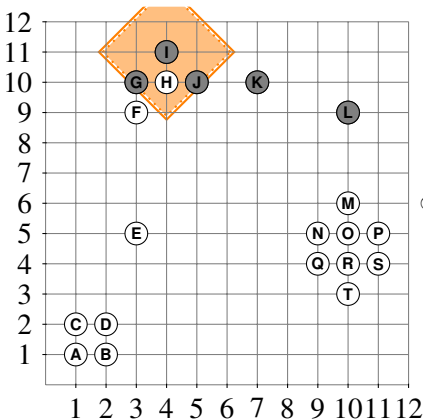
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

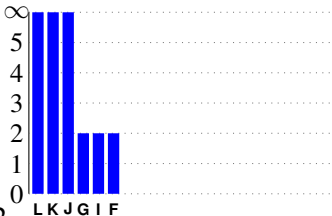
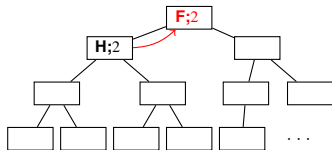
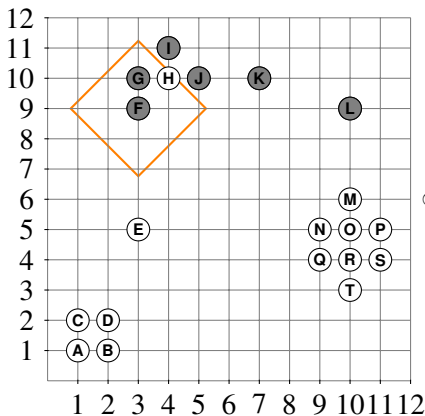
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

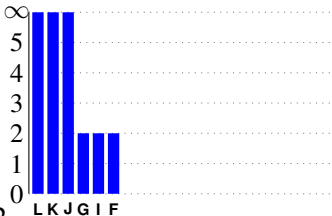
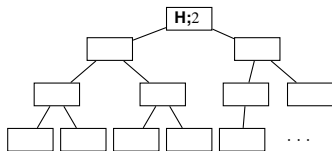
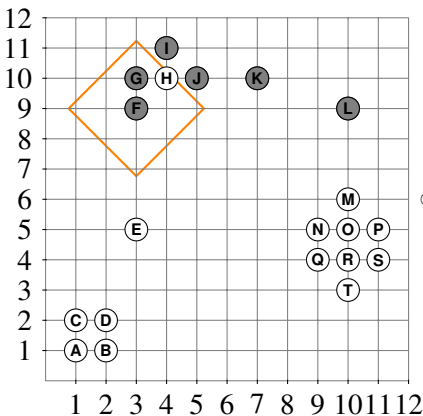
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

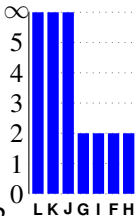
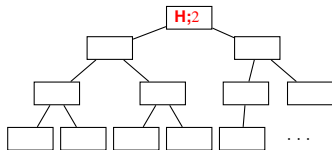
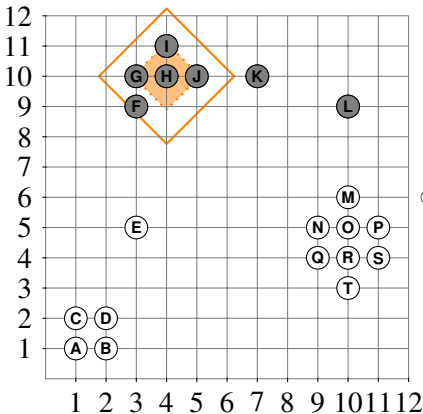
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

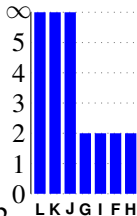
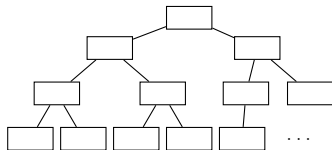
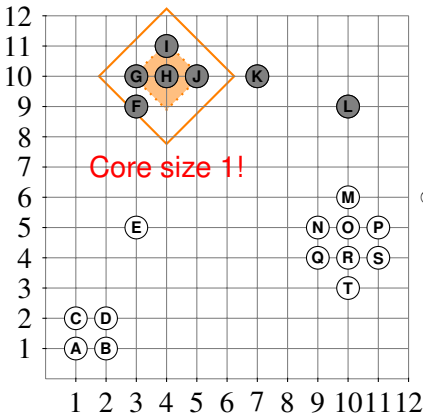
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

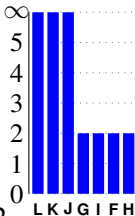
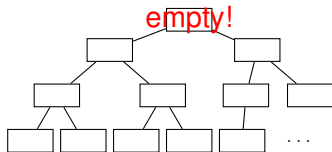
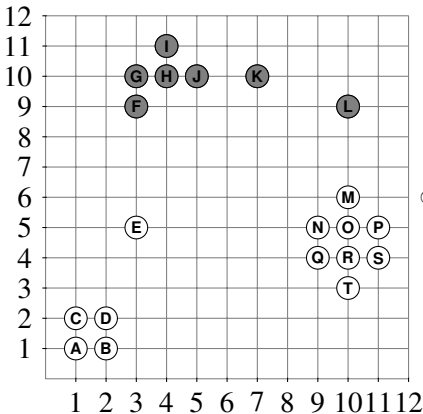
$\epsilon = 5$,
minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

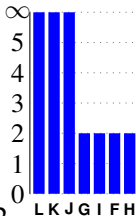
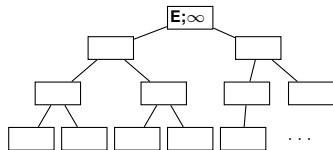
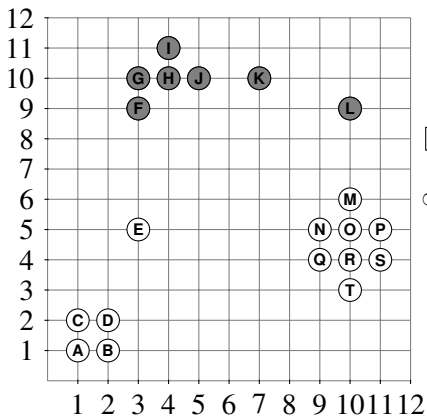
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

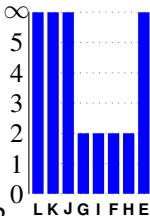
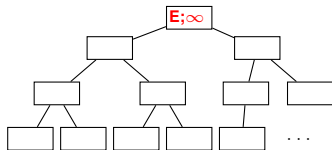
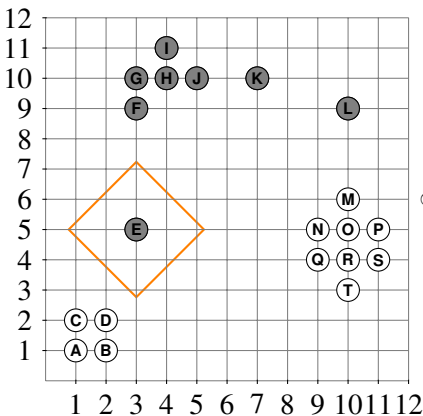
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

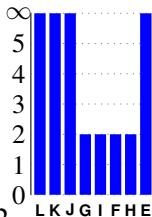
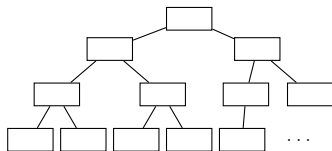
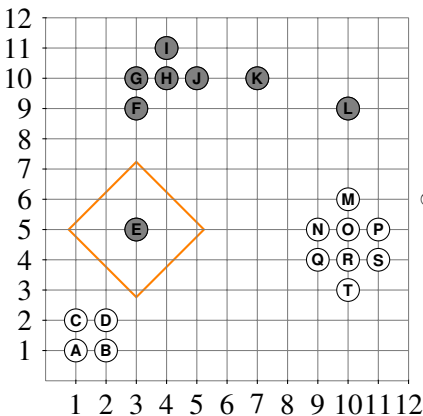
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

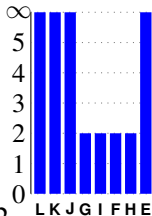
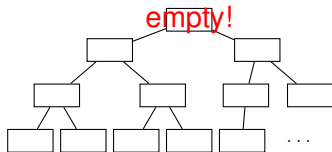
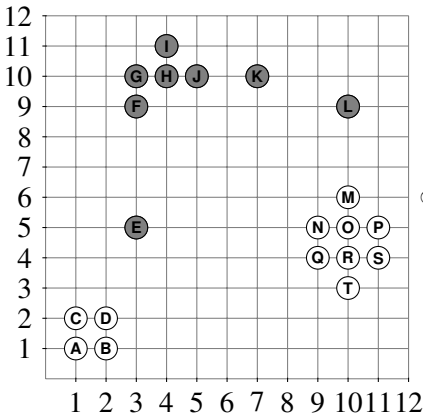
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minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

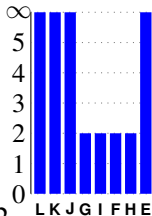
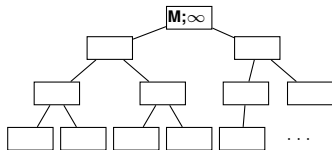
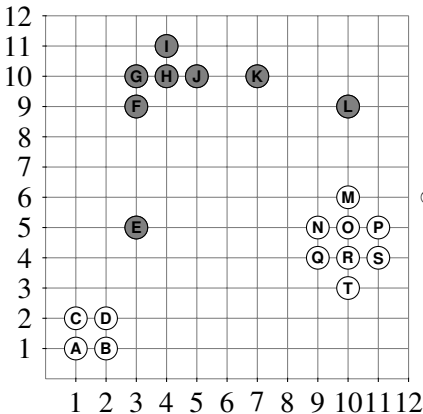
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minPts = 4

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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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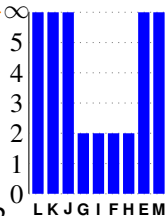
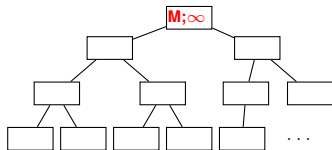
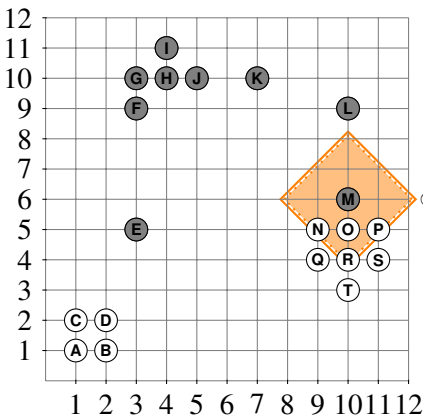
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

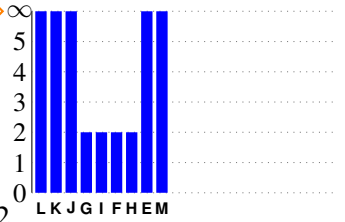
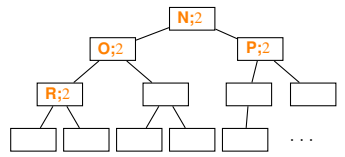
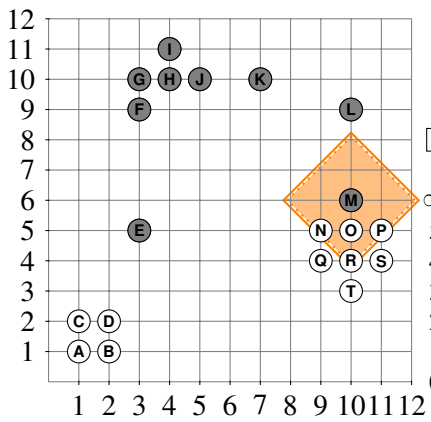
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minPts = 4

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

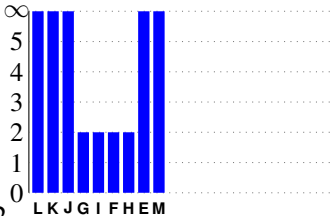
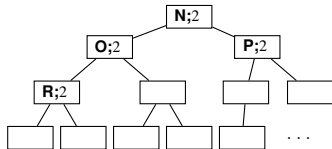
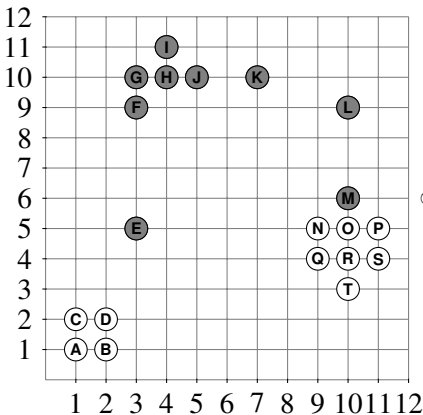
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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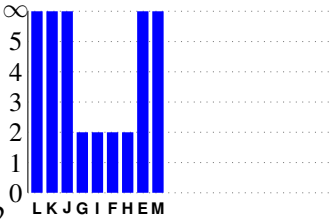
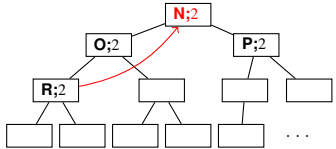
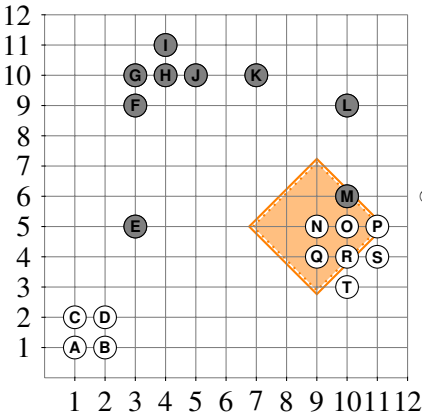
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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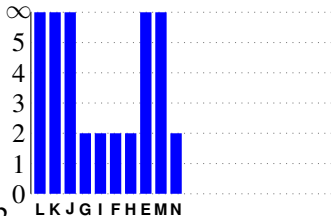
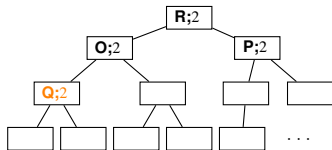
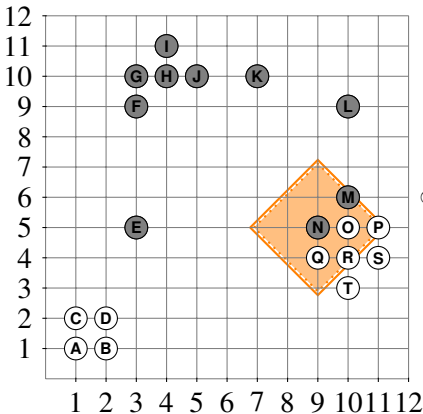
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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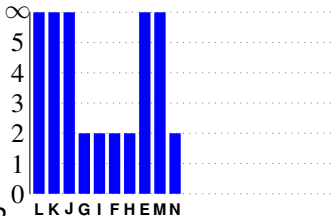
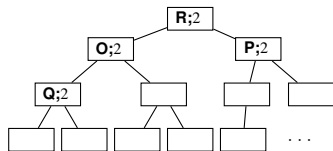
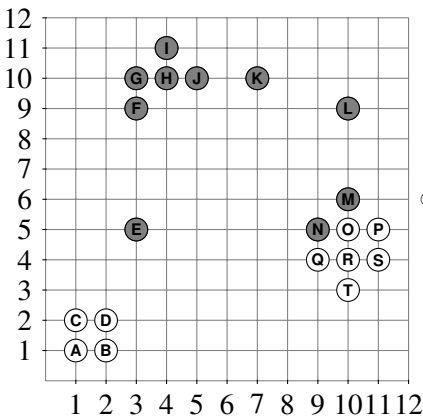
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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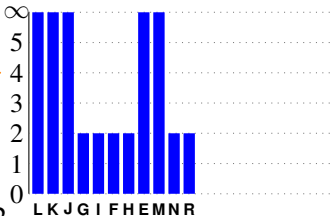
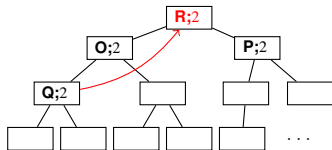
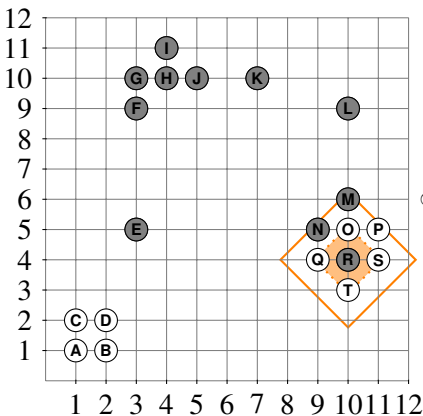
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minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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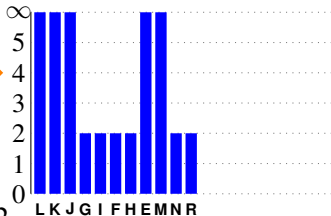
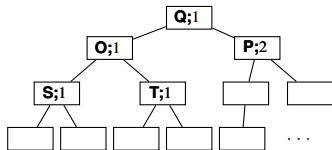
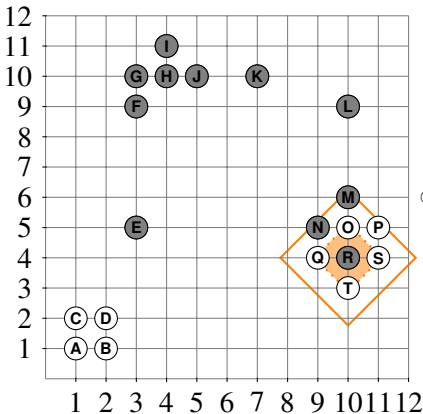
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

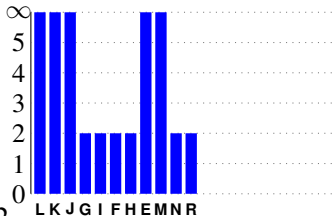
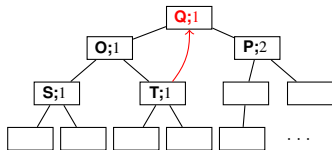
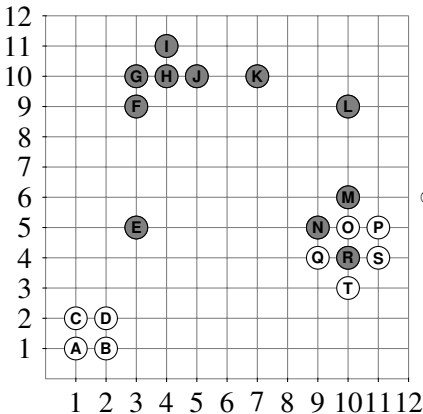
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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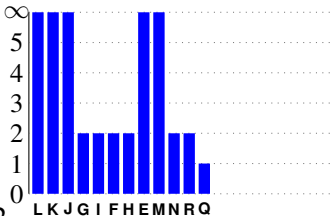
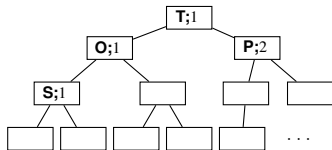
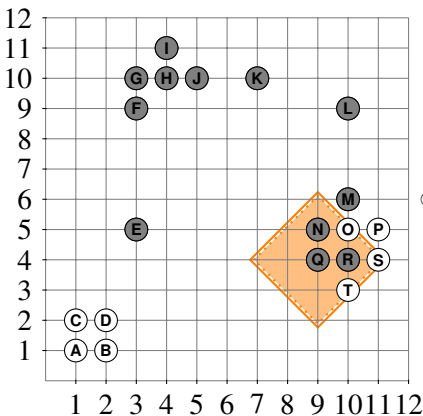
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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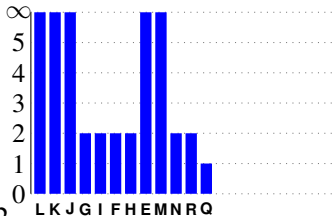
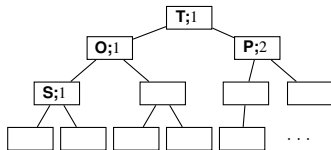
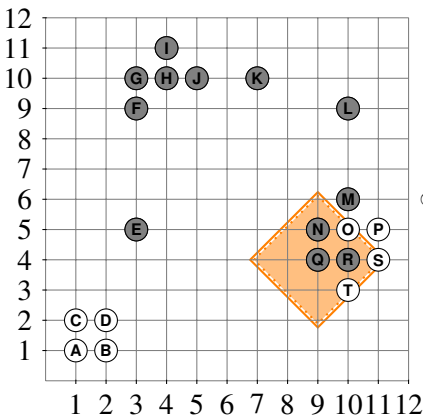
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

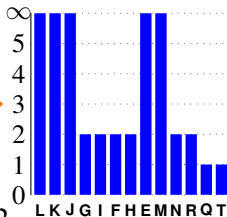
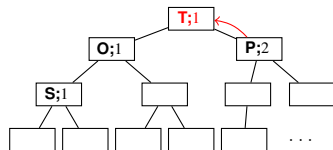
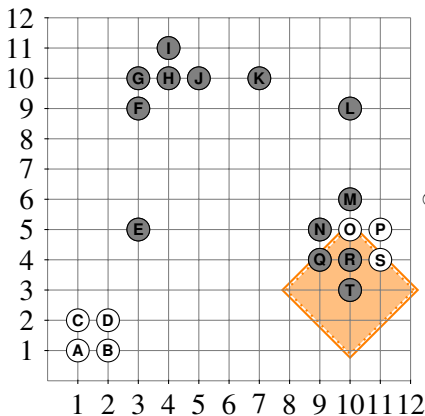
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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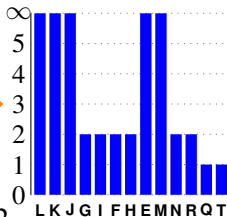
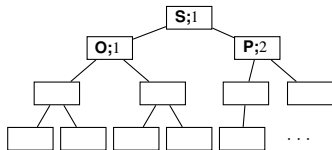
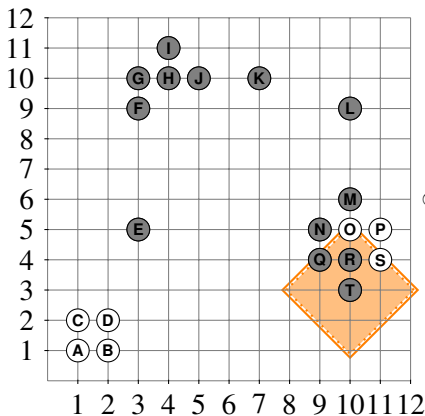
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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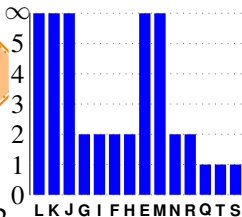
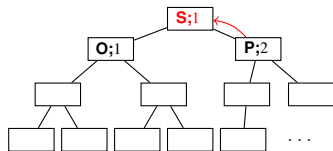
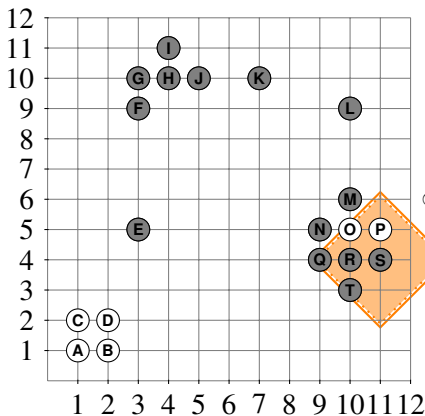
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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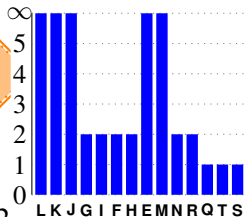
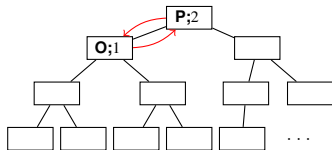
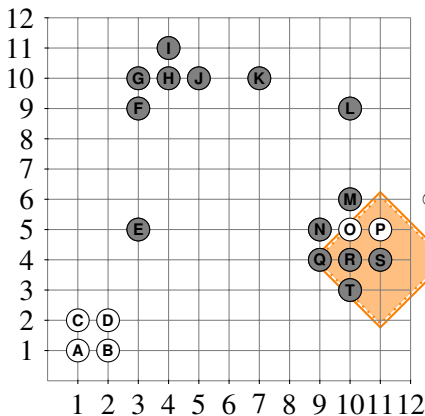
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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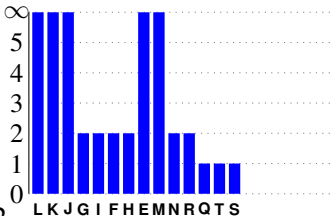
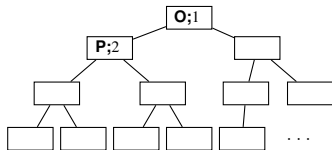
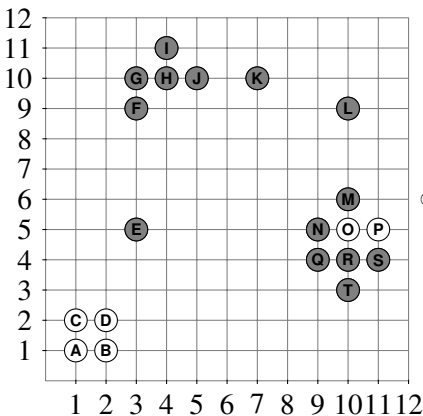
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

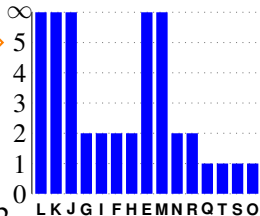
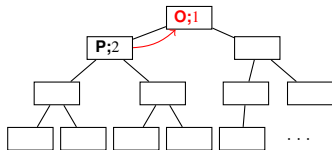
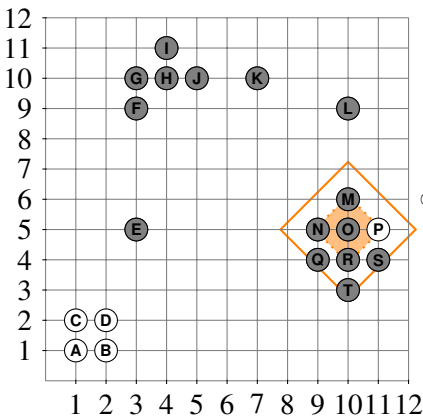
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minPts = 2

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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

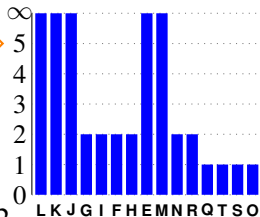
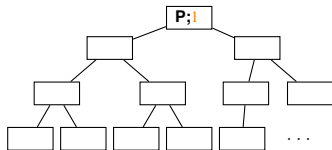
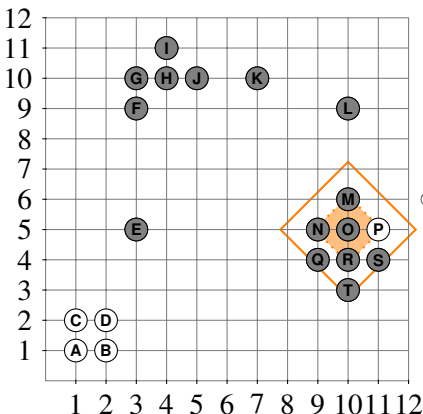
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

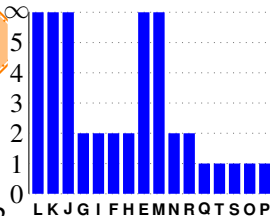
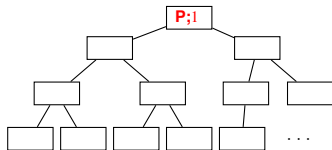
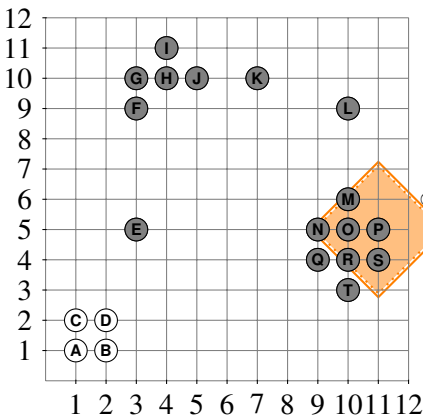
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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minPts = 2

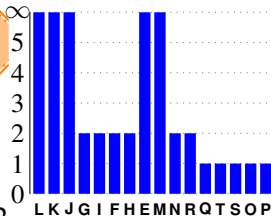
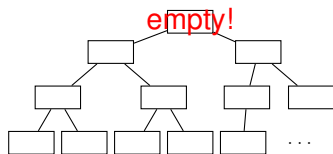
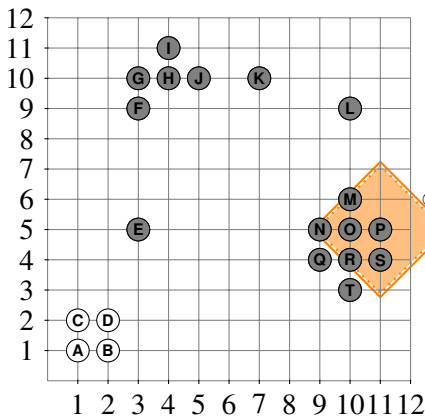
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

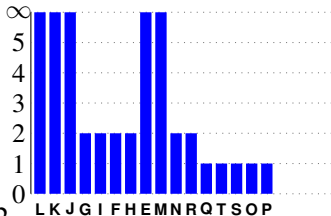
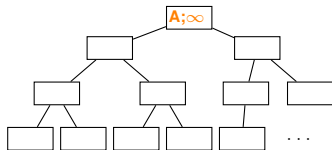
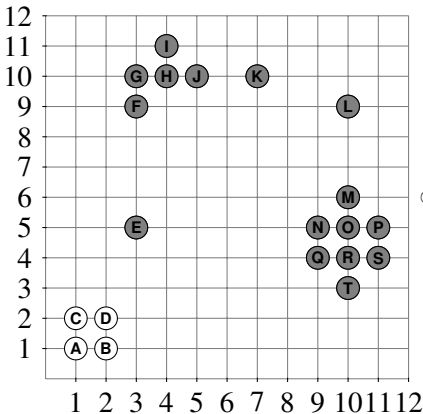
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

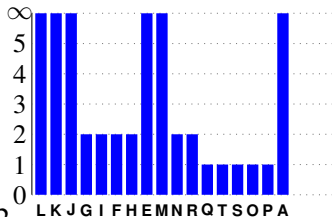
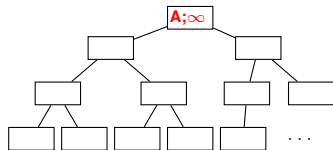
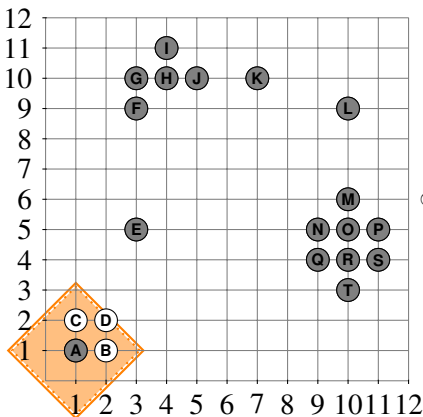
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Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

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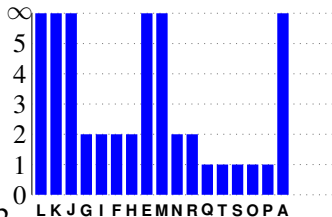
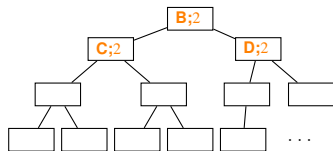
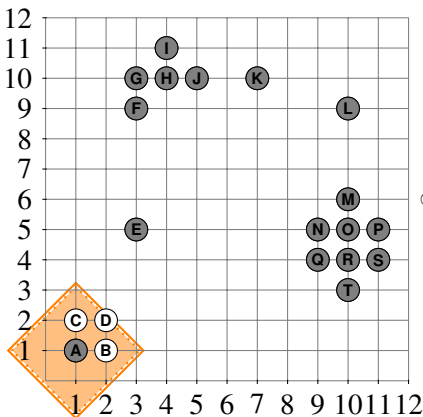
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

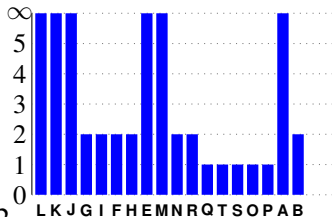
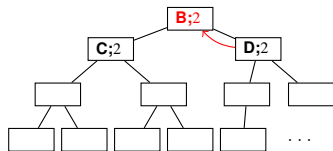
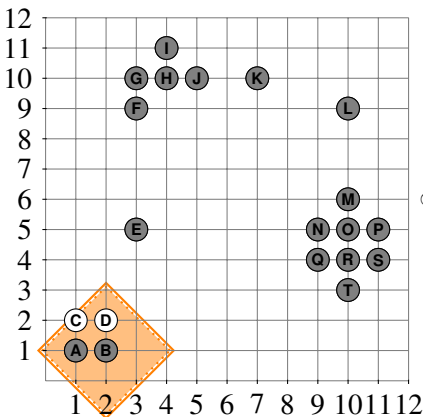
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

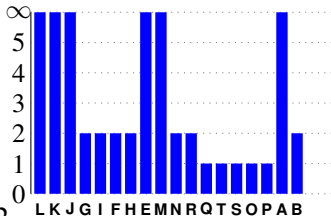
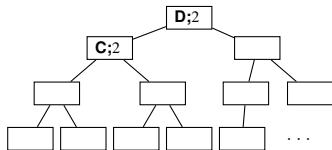
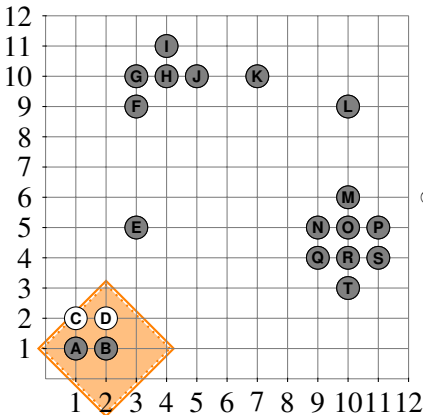
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

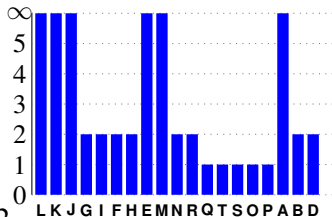
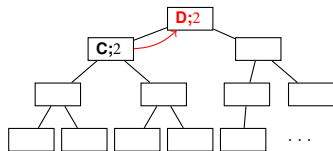
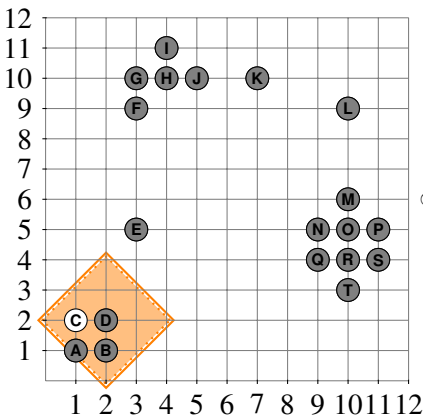
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

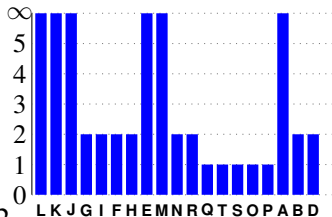
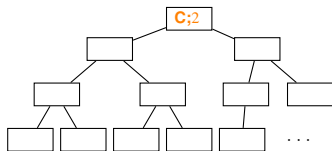
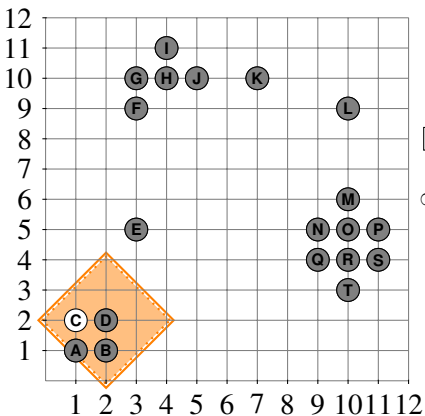
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

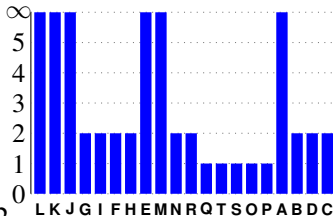
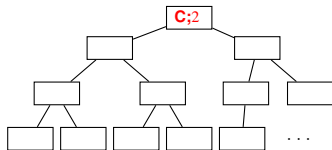
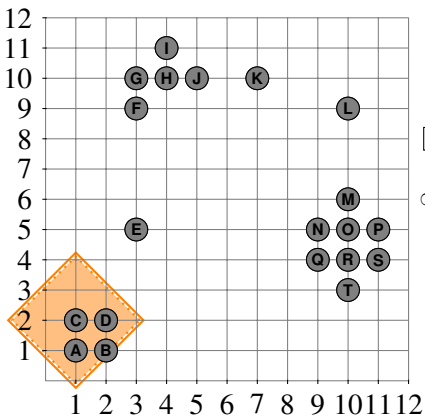
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

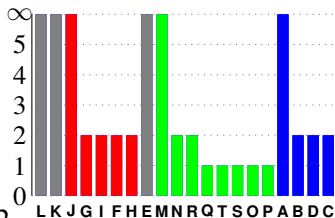
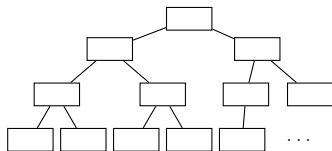
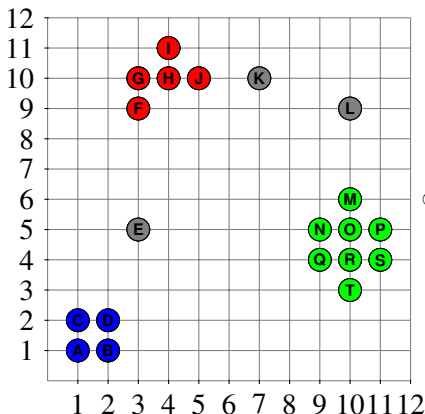
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



(Intuitive Cluster \approx Täler)

Anfang ("Eingang") gehört i.d.R. dazu, Ende nicht!

Aufgabe 8-1

$\epsilon = 5$,
minPts = 2

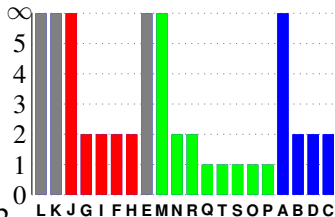
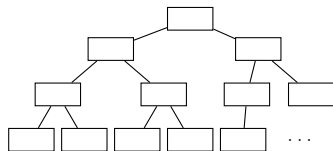
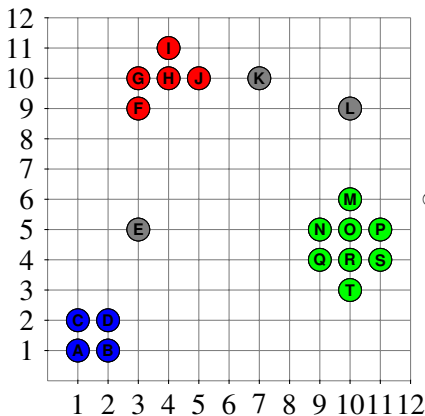
$\epsilon = 5$,
minPts = 4

$\epsilon = 2$,
minPts = 4

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link



Radius zu klein!

Aufgabe 8-1

$\epsilon = 5$,
 $\text{minPts} = 2$

$\epsilon = 5$,
 $\text{minPts} = 4$

$\epsilon = 2$,
 $\text{minPts} = 4$

Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

DBSCAN mit $\text{minPts} = 2 \Leftrightarrow$

Schnitt durch das single-linkage dendrogram auf Höhe ϵ .

Aufgabe 8-1

$\epsilon = 5$,
 $\text{minPts} = 2$
 $\epsilon = 5$,
 $\text{minPts} = 4$
 $\epsilon = 2$,
 $\text{minPts} = 4$
Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

DBSCAN mit $\text{minPts} = 2 \Leftrightarrow$

Schnitt durch das single-linkage dendrogram auf Höhe ϵ .

DBSCAN ist $\mathcal{O}(n^2)$ (mit Index auch nur: $\mathcal{O}(n \log n)$)

Aufgabe 8-1

 $\epsilon = 5,$
 $\text{minPts} = 2$ $\epsilon = 5,$
 $\text{minPts} = 4$ $\epsilon = 2,$
 $\text{minPts} = 4$

Vergleich

Aufgabe 8-2

DBSCAN und
Single-LinkDBSCAN mit $\text{minPts} = 2 \Leftrightarrow$ *Schnitt* durch das single-linkage dendrogram auf Höhe ϵ .DBSCAN ist $\mathcal{O}(n^2)$ (mit Index auch nur: $\mathcal{O}(n \log n)$)
aber nur für *ein einziges* ϵ .

Aufgabe 8-1

$\epsilon = 5$,
 $minPts = 2$
 $\epsilon = 5$,
 $minPts = 4$
 $\epsilon = 2$,
 $minPts = 4$
Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

DBSCAN mit $minPts = 2 \Leftrightarrow$

Schnitt durch das single-linkage dendrogram auf Höhe ϵ .

DBSCAN ist $\mathcal{O}(n^2)$ (mit Index auch nur: $\mathcal{O}(n \log n)$)
aber nur für *ein einziges* ϵ .

OPTICS mit $minPts = 2$ entspricht etwa SLINK
(Effizienter Algorithmus für single-linkage in $\mathcal{O}(n^2)$)

Aufgabe 8-1

$\epsilon = 5$,
 $minPts = 2$
 $\epsilon = 5$,
 $minPts = 4$
 $\epsilon = 2$,
 $minPts = 4$
Vergleich

Aufgabe 8-2

DBSCAN und
Single-Link

DBSCAN mit $minPts = 2 \Leftrightarrow$
Schnitt durch das single-linkage dendrogram auf Höhe ϵ .

DBSCAN ist $\mathcal{O}(n^2)$ (mit Index auch nur: $\mathcal{O}(n \log n)$)
aber nur für *ein einziges* ϵ .

OPTICS mit $minPts = 2$ entspricht etwa SLINK
(Effizienter Algorithmus für single-linkage in $\mathcal{O}(n^2)$)

Aber mit einem größeren $minPts$ werden die Ergebnisse
i.d.R. besser (statt single-link-effekt: Dichte-verbunden)!