

Start: **A**

A.CIId = Unclassified

ExpandCluster (DB, A, 1, 1.1, 3)

Unclassified
A B C D E F G H I J
K L M N O P Q R S T

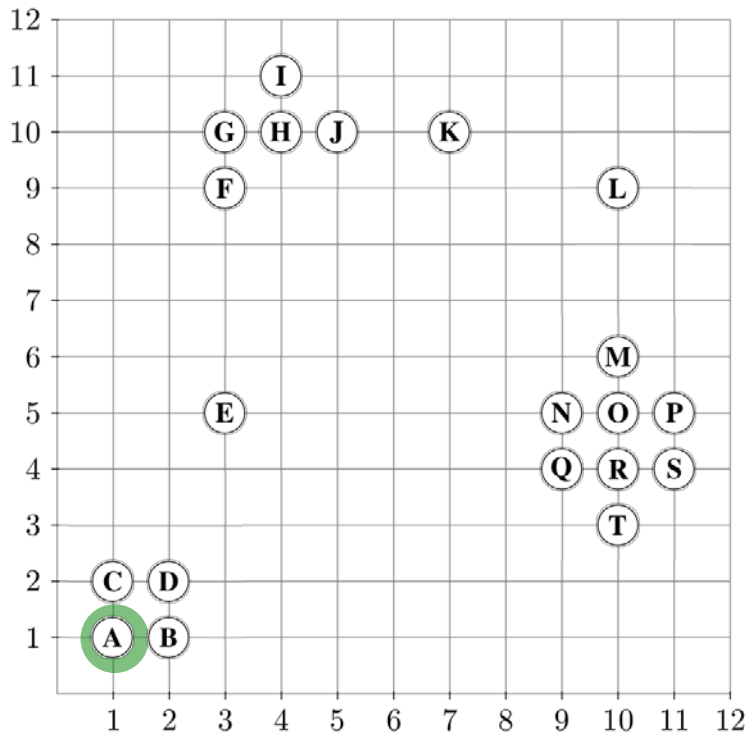
Noise

Seeds

Cluster 1:

Cluster 2:

Cluster 3:



Start: **A**

Seeds := RQ (A, 1.1)

Unclassified

A B C D E F G H I J
K L M N O P Q R S T

Noise

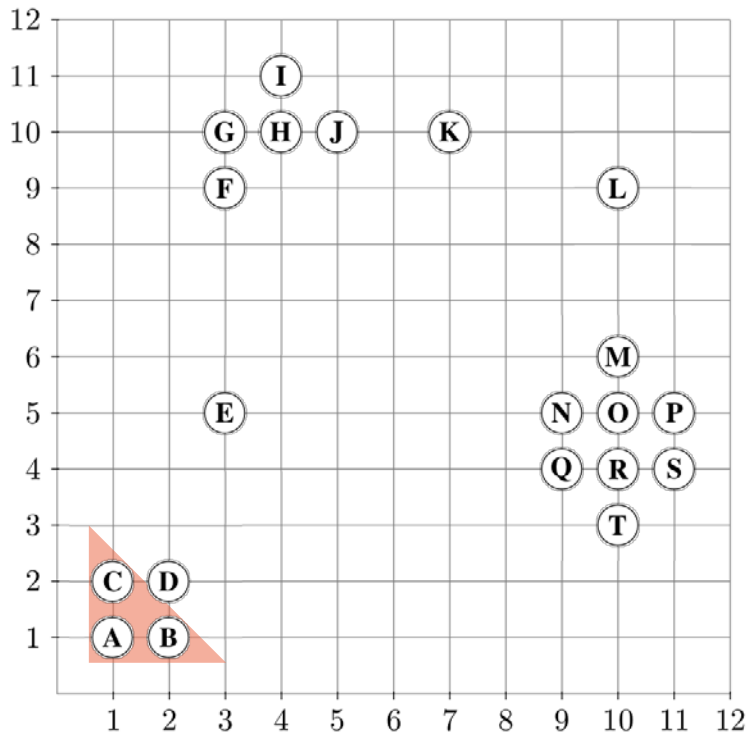
Seeds

A B C

Cluster 1:

Cluster 2:

Cluster 3:



Cluster: (A) (B) (C)

For all o in Seeds: o.ClId := ClusterId
 Remove starting object from Seeds

Unclassified

(D) (E) (F) (G) (H) (I) (J)
 (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T)

Noise

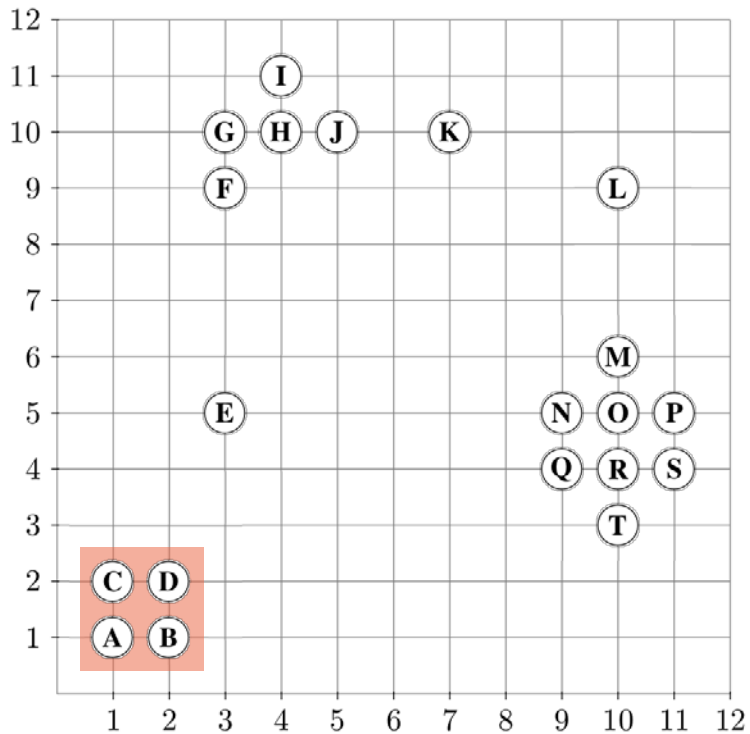
Seeds

(B) (C)

Cluster 1: A, B, C

Cluster 2:

Cluster 3:



Point: **(B)**

While Seeds != empty do
 RQ (B, 1.1) = {A, B, D}

A.CIId = 1. finished

B.CIId = 1. finished

D.CIId = Unclassified →

Seeds += D

D.CIId = 1

Remove B from Seeds

Unclassified

(E) (F) (G) (H) (I) (J)

(K) (L) (M) (N) (O) (P) (Q) (R) (S) (T)

Noise

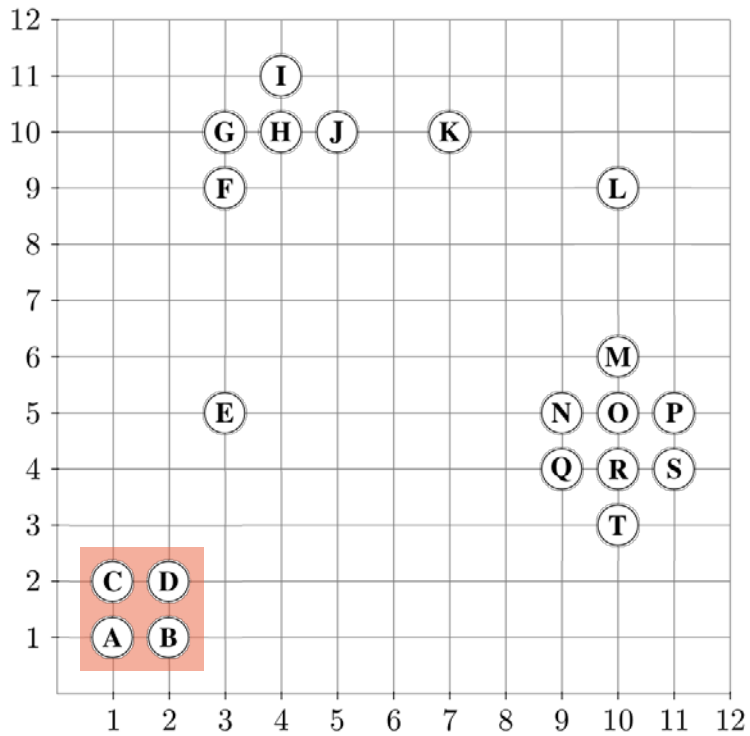
Seeds

(C) (D)

Cluster 1: A, B, C, D

Cluster 2:

Cluster 3:



Point: **C**

While Seeds != empty do
 RQ (C, 1.1) = {A, C, D}

A.CIId = 1. finished

C.CIId = 1. finished

D.CIId = 1. finisehd

Remove C from Seeds

Unclassified

E **F** **G** **H** **I** **J**

K **L** **M** **N** **O** **P** **Q** **R** **S** **T**

Noise

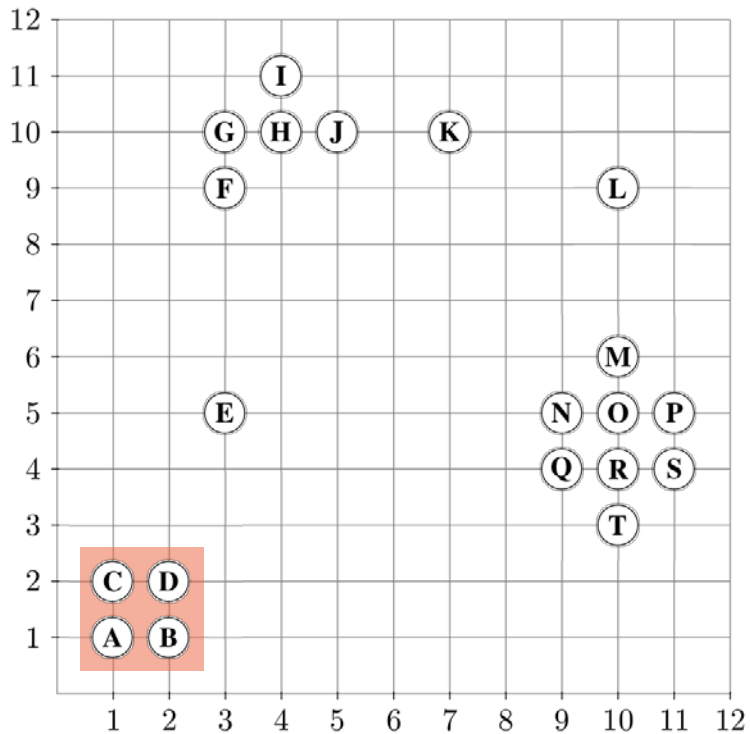
Seeds

D

Cluster 1: A, B, C, D

Cluster 2:

Cluster 3:



Point : **(D)**

While Seeds != empty do
 RQ (D, 1.1) = {B, C, D}

B.CIId = 1. finished

C.CIId = 1. finished

D.CIId = 1. finished

Remove D from Seeds

Unclassified

(E) (F) (G) (H) (I) (J)

(K) (L) (M) (N) (O) (P) (Q) (R) (S) (T)

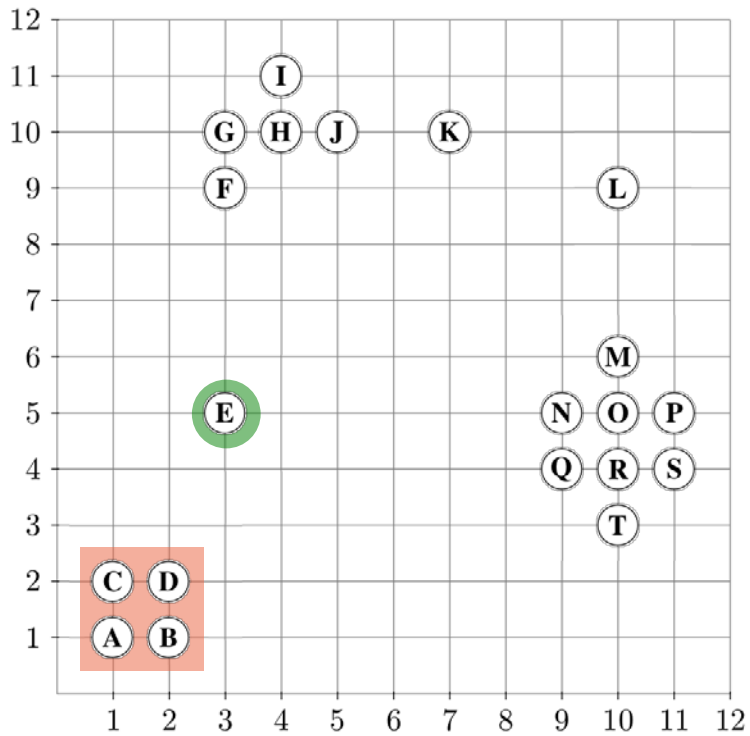
Noise

Seeds

Cluster 1: A, B, C, D

Cluster 2:

Cluster 3:

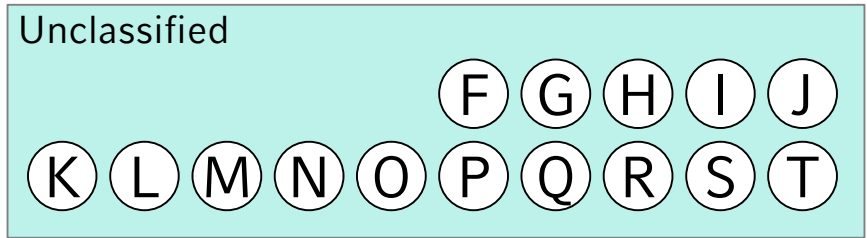


Start: (E)

E.CId = Unclassified

ExpandCluster (DB, E, 2, 1.1, 3) = false

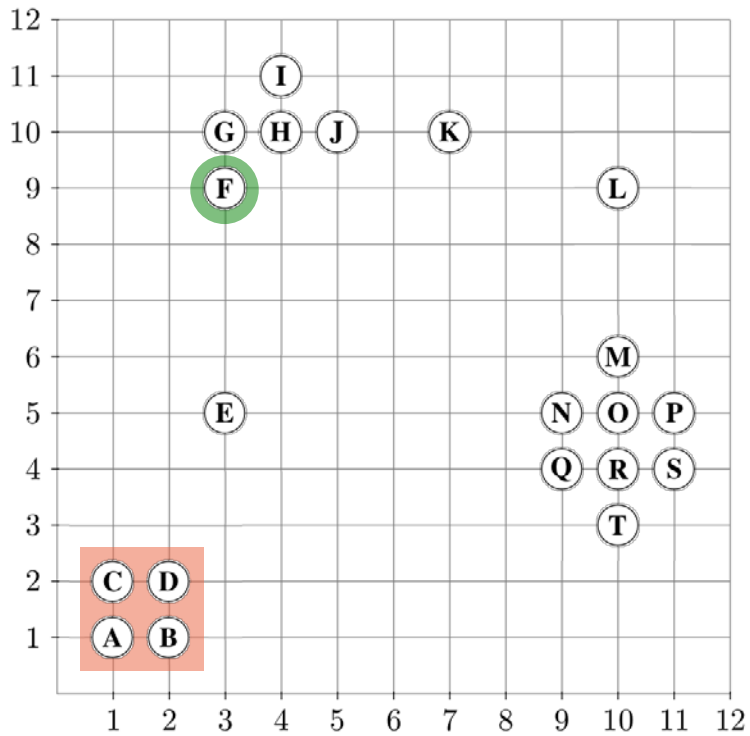
E.CId := Noise



Cluster 1: A, B, C, D

Cluster 2:

Cluster 3:



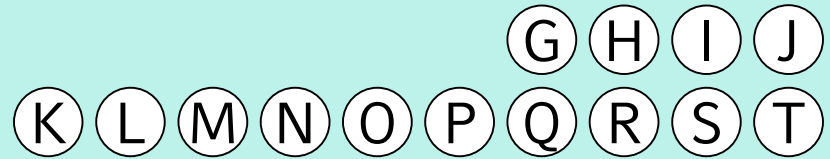
Start: (F)

F.CId = Unclassified

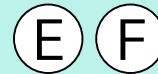
ExpandCluster (DB, F, 2, 1.1, 3)
 RQ (F, 1.1) = {F,G} → false

F.CId := Noise

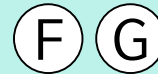
Unclassified



Noise



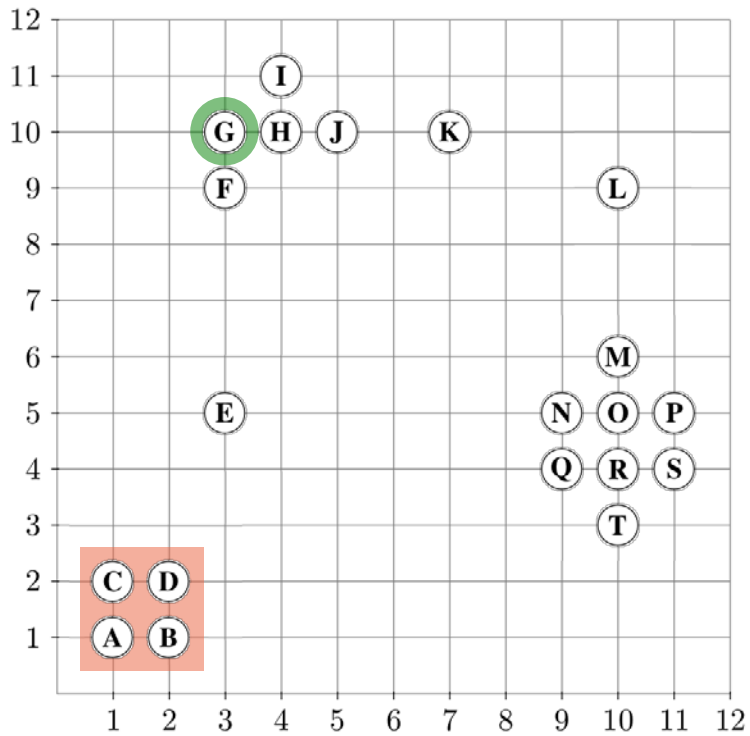
Seeds



Cluster 1: A, B, C, D

Cluster 2:

Cluster 3:



Start: (G)

G.CId = Unclassified

ExpandCluster (DB, G, 2, 1.1, 3)

RQ (G, 1.1) = {F,G,H}

Unclassified

(G) (H) (I) (J)

(K) (L) (M) (N) (O) (P) (Q) (R) (S) (T)

Noise

(E) (F)

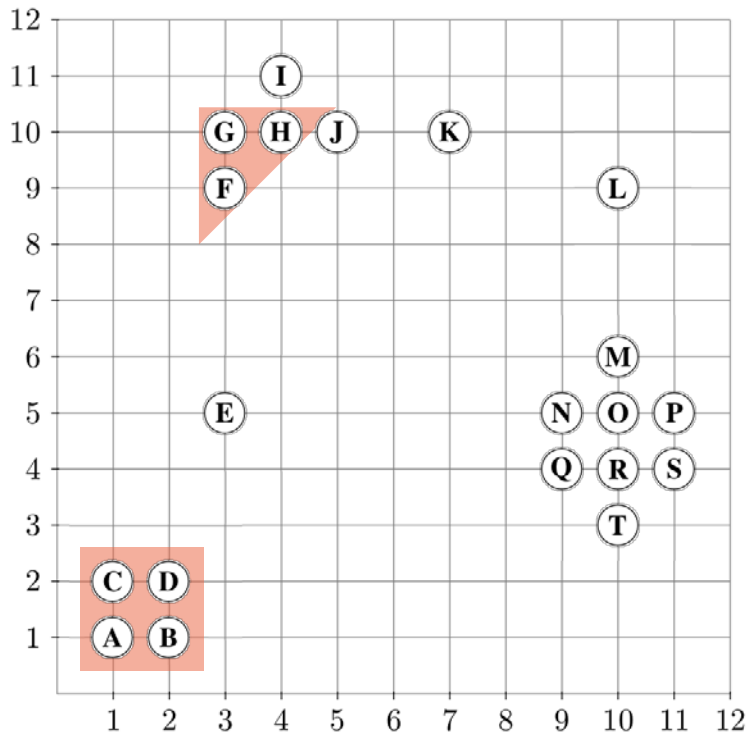
Seeds

(F) (G) (H)

Cluster 1: A, B, C, D

Cluster 2:

Cluster 3:



Cluster: (F) (G) (H)

For all o in Seeds:
 o.ClId := ClusterId
 Remove G from Seeds

Unclassified
 (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (I) (J)

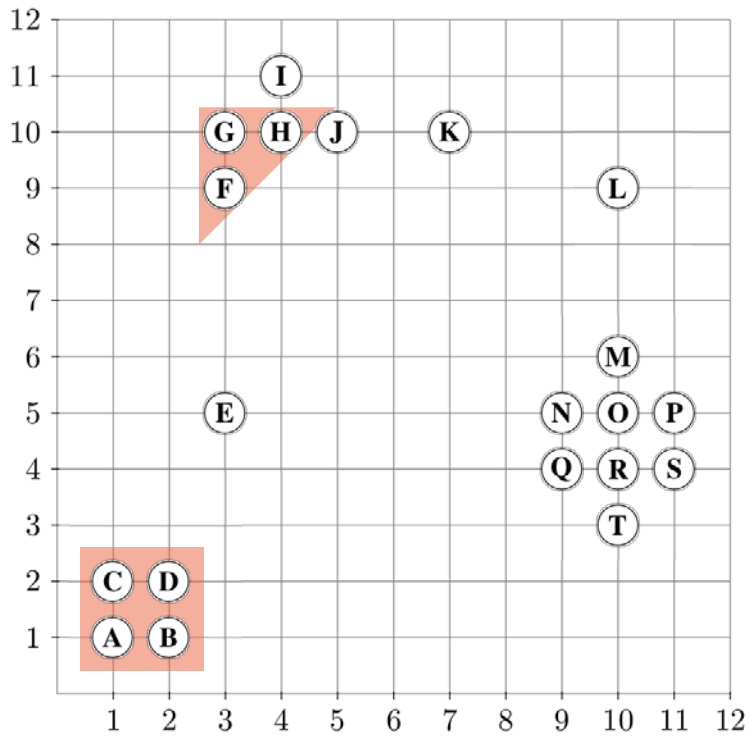
Noise
 (E)

Seeds
 (F) (H)

Cluster 1: A, B, C, D

Cluster 2: F, G, H

Cluster 3:



Point : $\textcircled{\text{F}}$

While Seeds \neq empty do
 $RQ(\text{F}, 1.1) = \{\text{F}, \text{G}\}$

$|\text{Neighbors}| < \text{MinPts}$

Remove F from Seeds

Unclassified

$\textcircled{\text{K}}$ $\textcircled{\text{L}}$ $\textcircled{\text{M}}$ $\textcircled{\text{N}}$ $\textcircled{\text{O}}$ $\textcircled{\text{P}}$ $\textcircled{\text{Q}}$ $\textcircled{\text{R}}$ $\textcircled{\text{S}}$ $\textcircled{\text{T}}$ $\textcircled{\text{I}}$ $\textcircled{\text{J}}$

Noise

$\textcircled{\text{E}}$

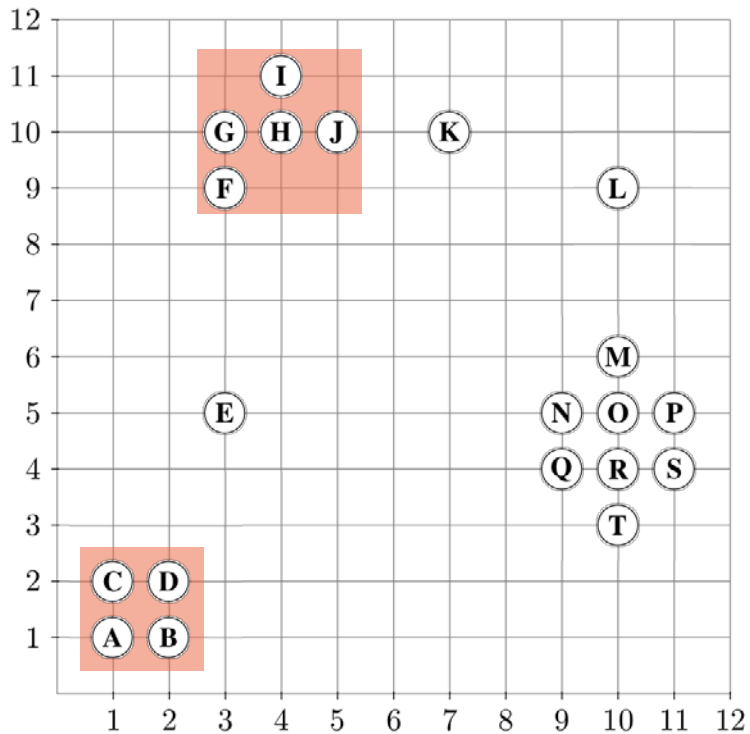
Seeds

$\textcircled{\text{H}}$

Cluster 1: A, B, C, D

Cluster 2: F, G, H

Cluster 3:



Point : $\textcircled{\text{H}}$

While Seeds \neq empty do
 $RQ(H, 1.1) = \{G, H, I, J\}$

G.CId = 2. finished

H.CId = 2. finished

I.CId = Unclassified \rightarrow Seeds += I

J.CId = Unclassified \rightarrow Seeds += J

I.CId := J.CId := 2

Remove H from Seeds

Unclassified

$\textcircled{\text{K}}$ $\textcircled{\text{L}}$ $\textcircled{\text{M}}$ $\textcircled{\text{N}}$ $\textcircled{\text{O}}$ $\textcircled{\text{P}}$ $\textcircled{\text{Q}}$ $\textcircled{\text{R}}$ $\textcircled{\text{S}}$ $\textcircled{\text{T}}$

Noise

$\textcircled{\text{E}}$

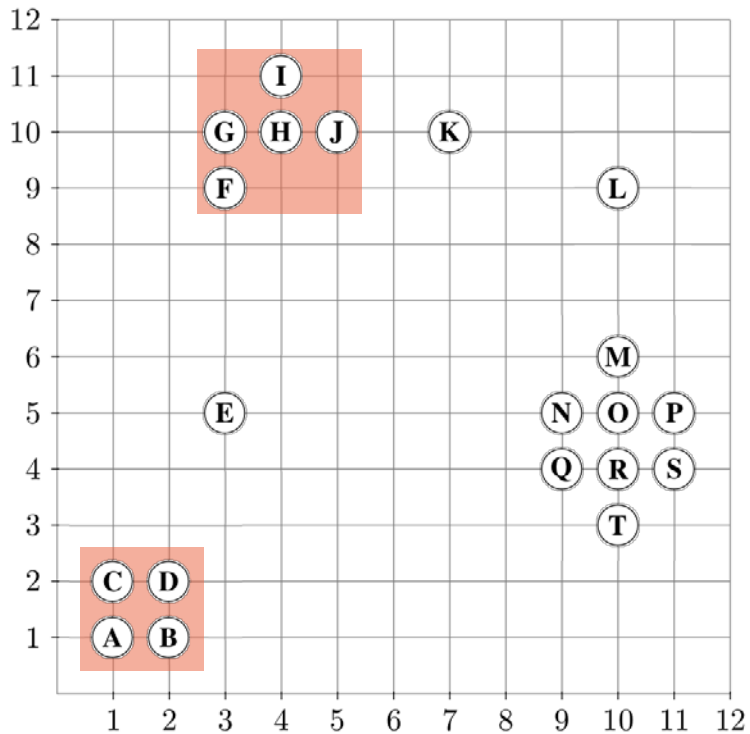
Seeds

$\textcircled{\text{I}}$ $\textcircled{\text{J}}$

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3:



Point: \textcircled{I}

While Seeds \neq empty do
 RQ (I, 1.1) = {H, I}

|Neighbors| < MinPts

Remove I from Seeds

Unclassified

\textcircled{K} \textcircled{L} \textcircled{M} \textcircled{N} \textcircled{O} \textcircled{P} \textcircled{Q} \textcircled{R} \textcircled{S} \textcircled{T}

Noise

\textcircled{E}

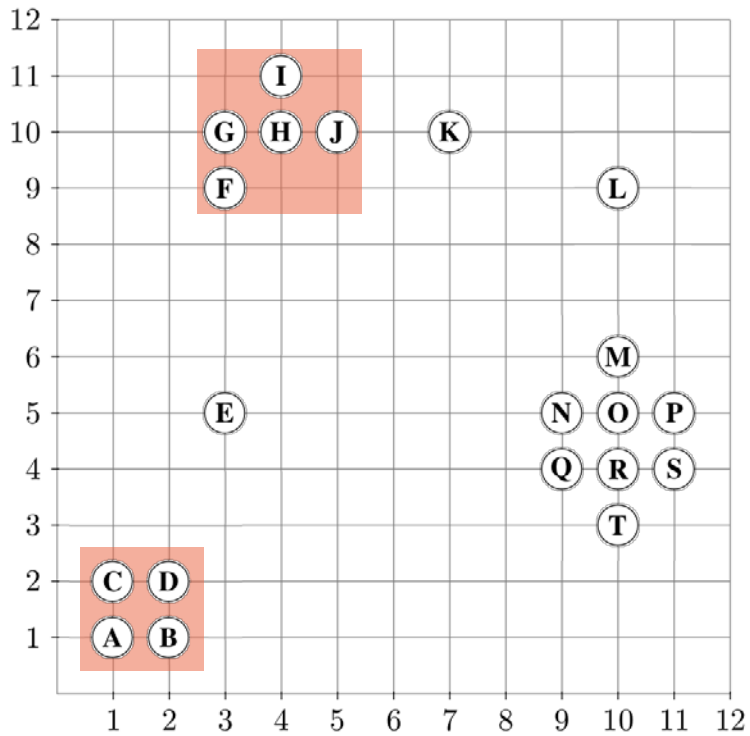
Seeds

\textcircled{J}

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3:



Point: **J**

While Seeds != empty do
 RQ (J, 1.1) = {H, J}

|Neighbors| < MinPts

Remove J from Seeds

Unclassified

K L M N O P Q R S T

Noise

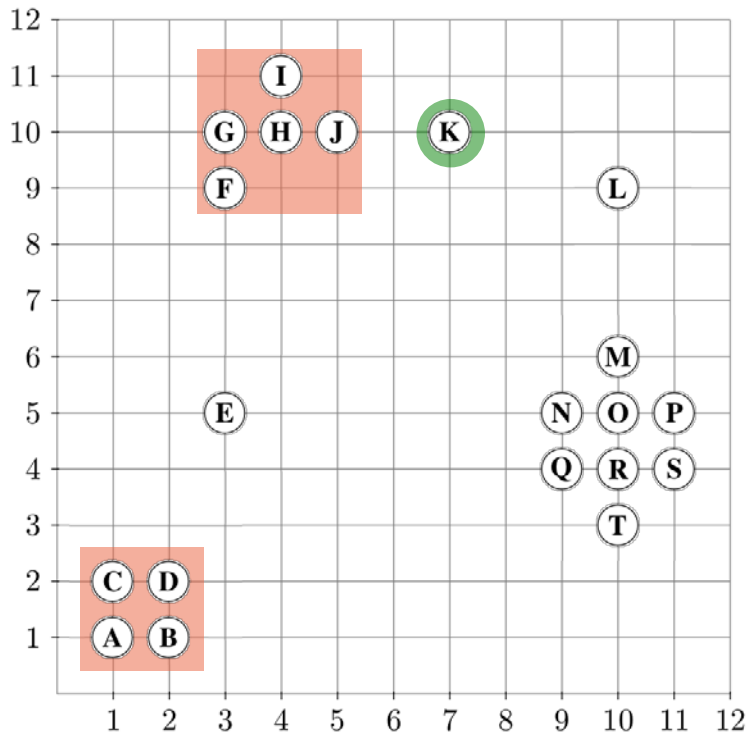
E

Seeds

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3:



Start: **(K)**

K.ClId = Unclassified

ExpandCluster (DB, K, 3, 1.1, 3) = false

K.ClId := Noise

Unclassified

(L) **(M)** **(N)** **(O)** **(P)** **(Q)** **(R)** **(S)** **(T)**

Noise

(E) **(K)**

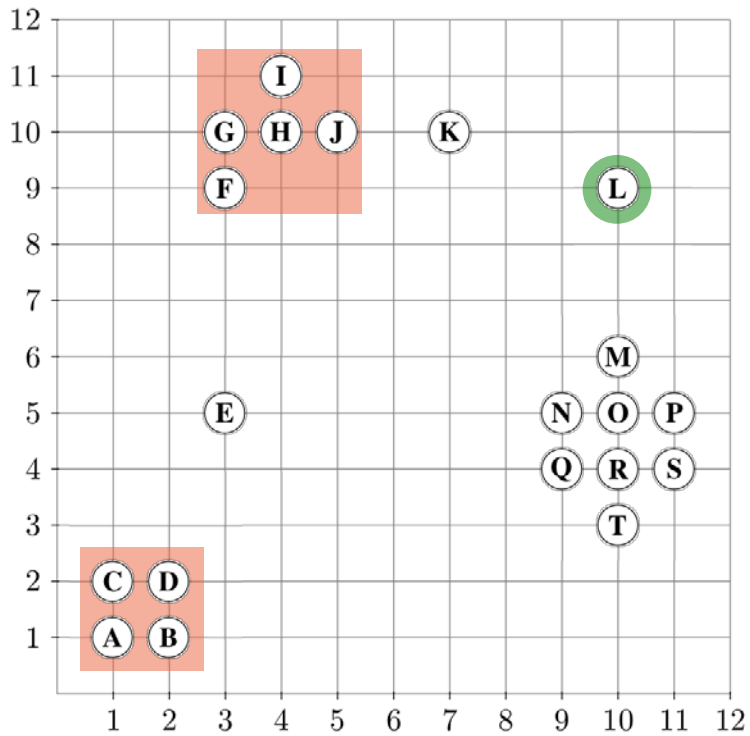
Seeds

(K)

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3:



Start: (L)

L.CId = Unclassified

ExpandCluster (DB, L, 3, 1.1, 3) = false

L.CId := Noise

Unclassified

(M) (N) (O) (P) (Q) (R) (S) (T)

Noise

(E) (K) (L)

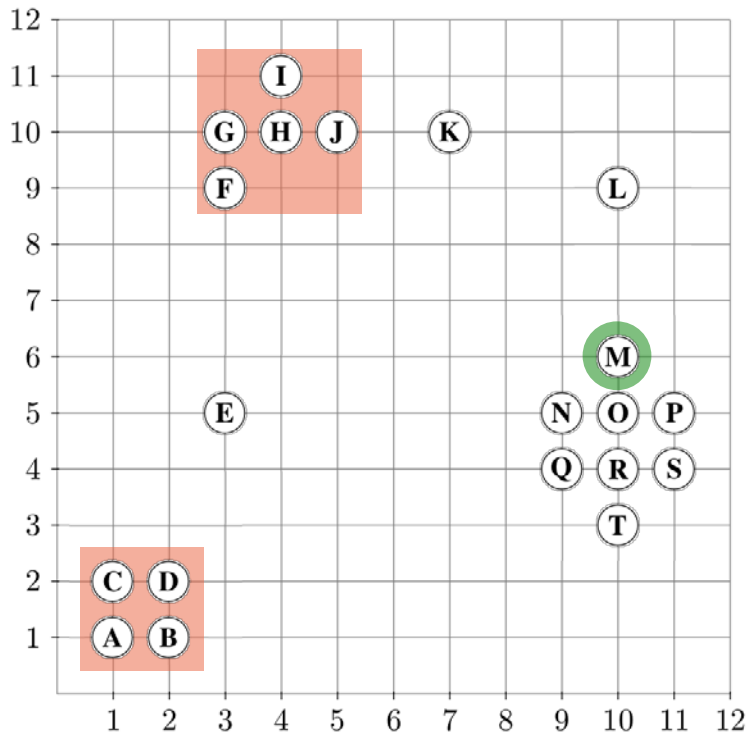
Seeds

(L)

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3:



Start: \textcircled{M}

M.ClId = Unclassified

ExpandCluster (DB, M, 3, 1.1, 3)

RQ (M, 1.1) = {M, O} → false

M.ClId := Noise

Unclassified

\textcircled{N} \textcircled{O} \textcircled{P} \textcircled{Q} \textcircled{R} \textcircled{S} \textcircled{T}

Noise

\textcircled{E} \textcircled{K} \textcircled{L} \textcircled{M}

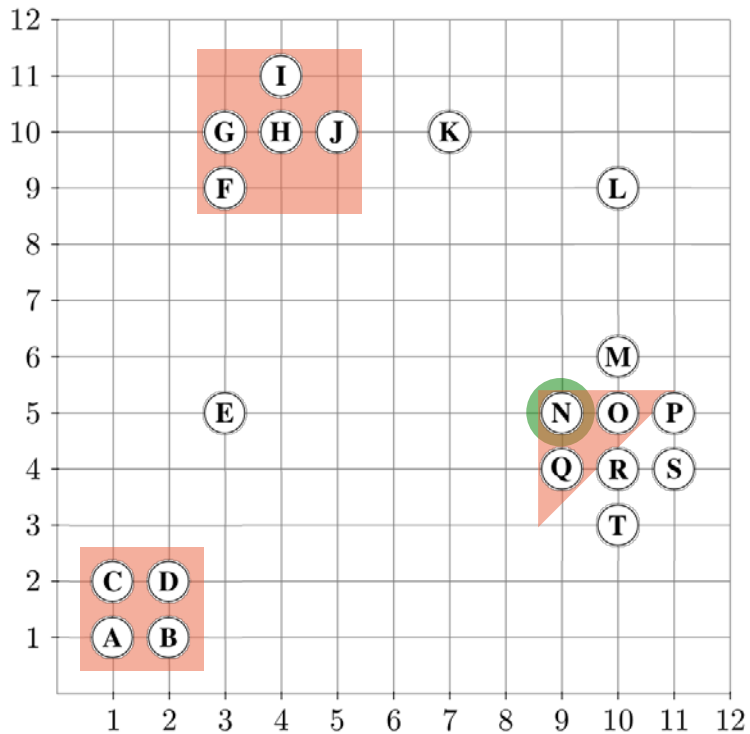
Seeds

\textcircled{M} \textcircled{O}

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3:



Start: (N) Cluster: (N) (O) (Q)

N.CIId = Unclassified

ExpandCluster (DB, N, 3, 1.1, 3)

RQ (M, 1.1) = {N, O, Q}

Forall o in Seeds:

o.CIId := ClusterId

Remove N from Seeds

Unclassified

(P) (R) (S) (T)

Noise

(E) (K) (L) (M)

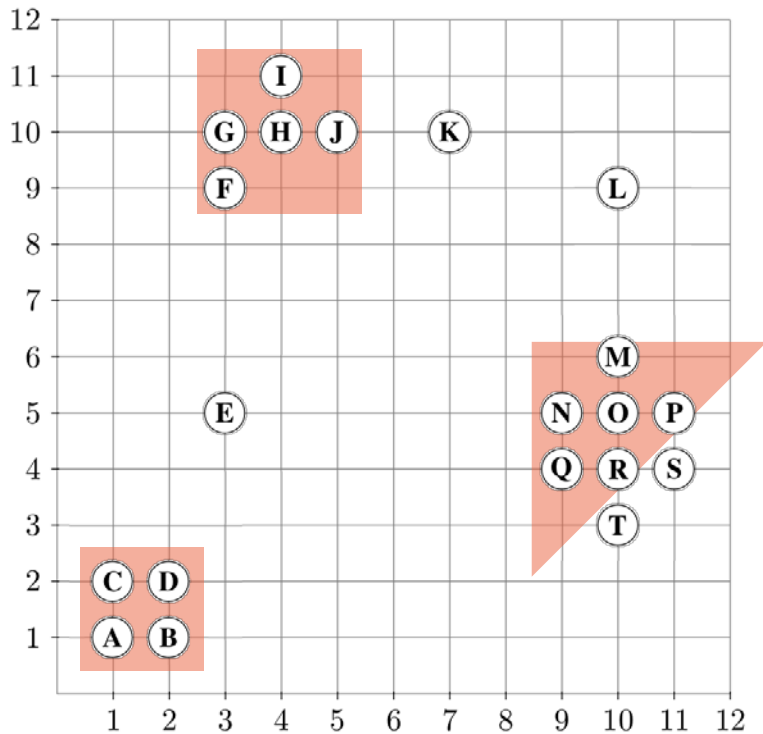
Seeds

(O) (Q)

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: N, O, Q



Point: **O**

While Seeds != empty do
 RQ (O, 1.1) = {M, N, O, P, R}

M.ClId = Noise → M.ClId := 3

N.ClId = 3. finished

O.ClId = 3. finished

P.ClId = Unclassified → Seeds += P, P.ClId := 3

R.ClId = Unclassified → Seeds += R, R.ClId := 3

Remove O from Seeds

Unclassified

S **T**

Noise

E **K** **L**

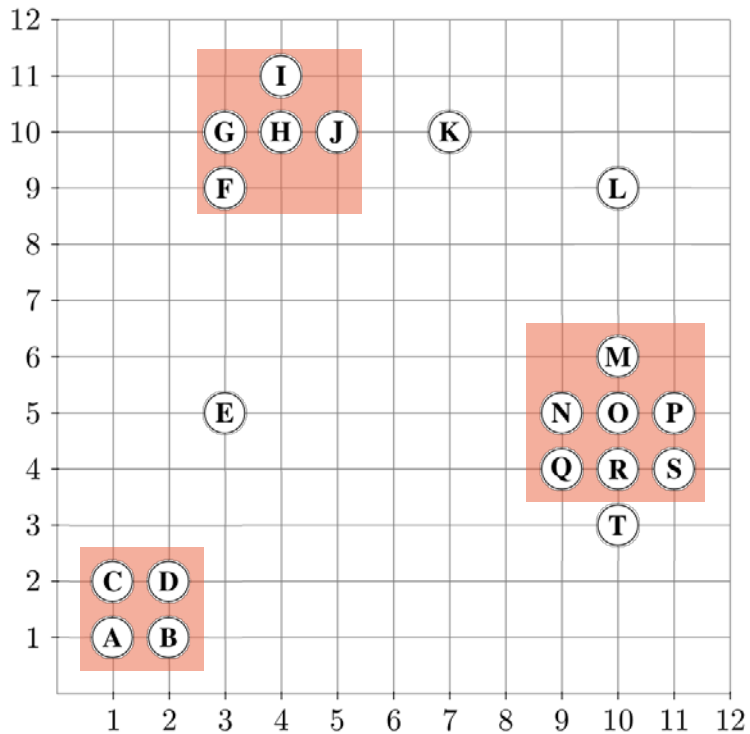
Seeds

P **Q** **R**

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R



Point: **P**

While Seeds != empty do
 RQ (P, 1.1) = {O, P, S}

O.CIId = 3. finished

P.CIId = 3. finished

S.CIId = Unclassified → Seeds += S, S.CIId := 3

Remove P from Seeds

Unclassified
T

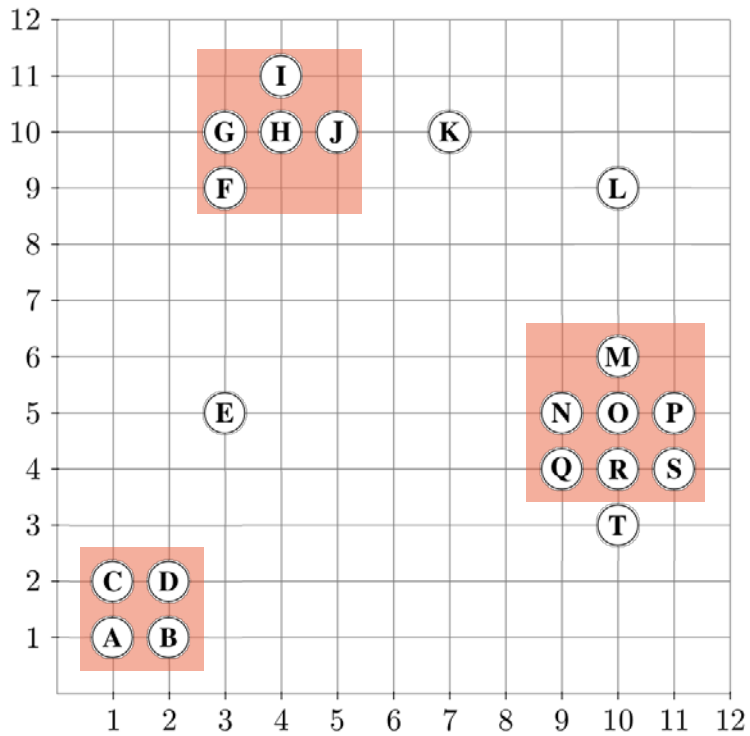
Noise
E K L

Seeds
Q R S

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R, S



Point: **Q**

While Seeds != empty do
 RQ (Q, 1.1) = {N, Q, R}

N.CIId = 3. finished
 Q.CIId = 3. finished
 R.CIId = 3. finished

Remove Q from Seeds

Unclassified
T

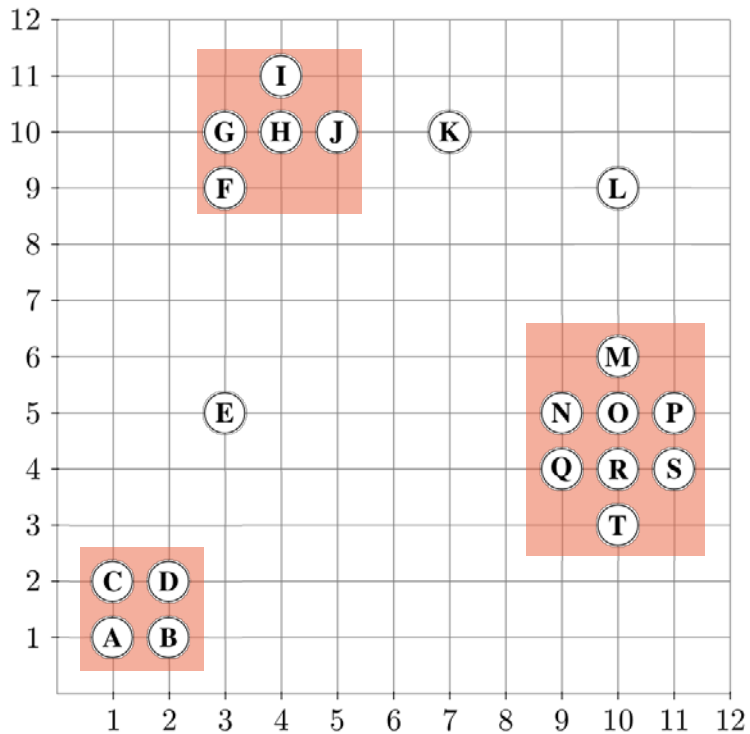
Noise
E K L

Seeds
R S

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R, S



Point: **(R)**

While Seeds != empty do
 RQ (R, 1.1) = {O, Q, R, S, T}

O.CId = 3. finished

Q. CId = 3. finished

R.CId = 3. finished

S.CId = 3. finished

T.CId = Unclassified → Seeds += T; T.CId := 3

Remove R from Seeds

Unclassified

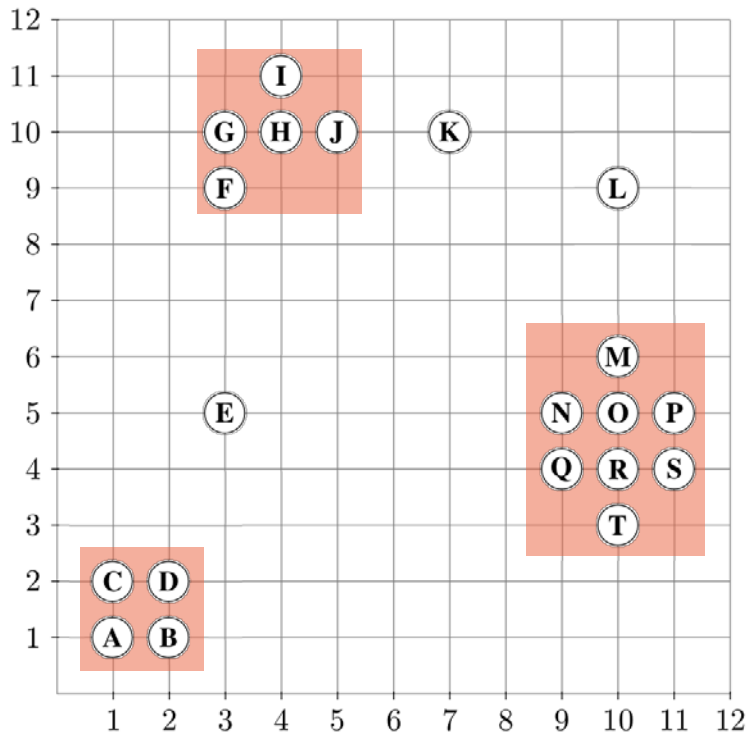
Noise
(E) (K) (L)

Seeds
(S) (T)

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R, S, T



Point: \textcircled{S}

While Seeds \neq empty do
 $RQ(S, 1.1) = \{P, R, S\}$

P.Clld = 3. finished
 R. Clld = 3. finished
 S.Clld = 3. finished

Remove S from Seeds

Unclassified

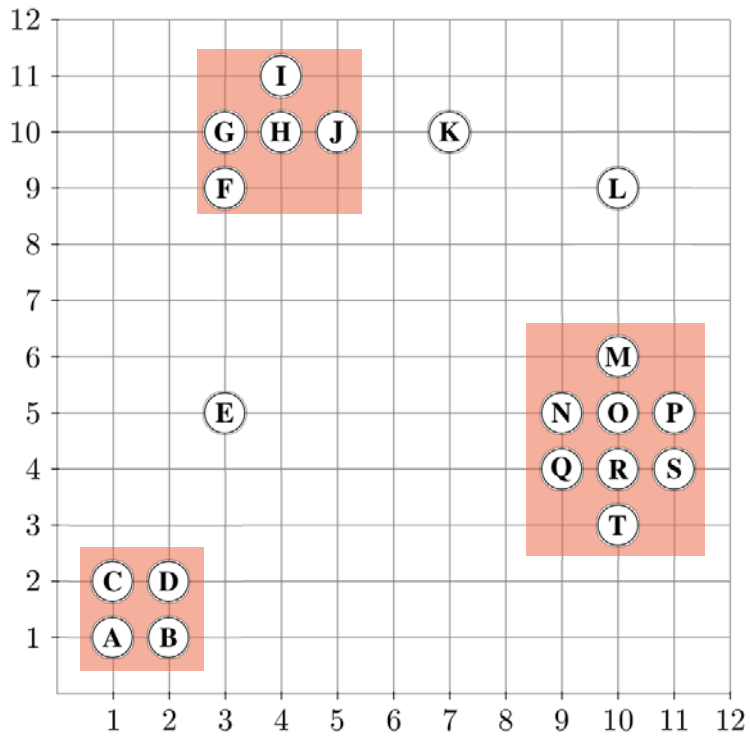
Noise
 \textcircled{E} \textcircled{K} \textcircled{L}

Seeds
 \textcircled{T}

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R, S, T



Point: \textcircled{T}

While Seeds \neq empty do
 $RQ(T, 1.1) = \{R, T\}$

$|\text{Neighbors}| < \text{MinPts}$

Remove T from Seeds

Unclassified

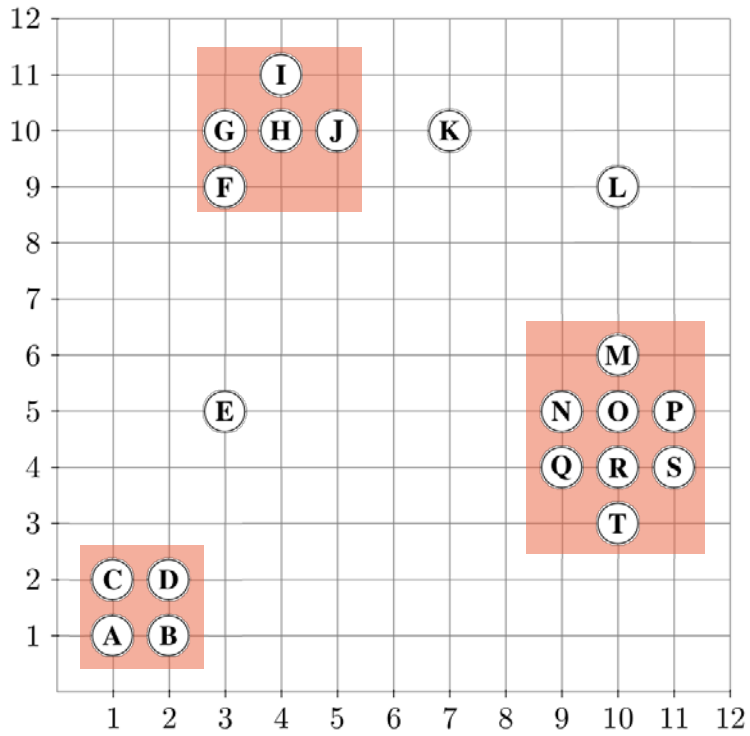
Noise
 \textcircled{E} \textcircled{K} \textcircled{L}

Seeds

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R, S, T



Unclassified

Noise

E K L

Seeds

Cluster 1: A, B, C, D

Cluster 2: F, G, H, I, J

Cluster 3: M, N, O, P, Q, R, S, T