

Machine Learning

- ▼ Exercise 1, 29.04.2015
- ▼ Introduction

Lecture: Prof. Dr. Volker Tresp
Exercise: Gregor Jossé, Johannes Niedermayer
Tutor: Markus Rohm

Roadmap

- ▼ Organisational matters
- ▼ Hints
- ▼ Motivation
- ▼ Exercise

Organisational matters

Organisational Matters

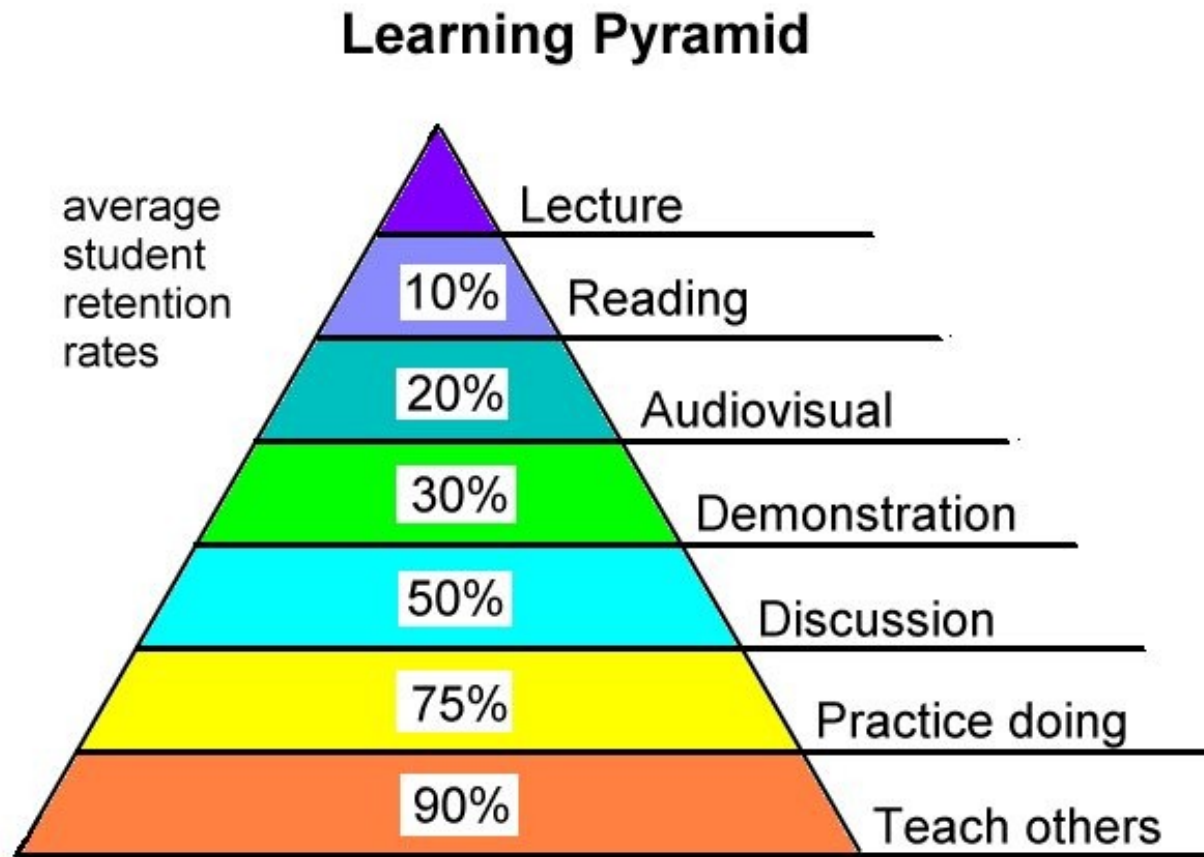
- ▼ First exercise (14:00 – 16:00) in **english**
- ▼ Second exercise (16:00 – 18:00) in **german**

Hints

Learning in general

Hints

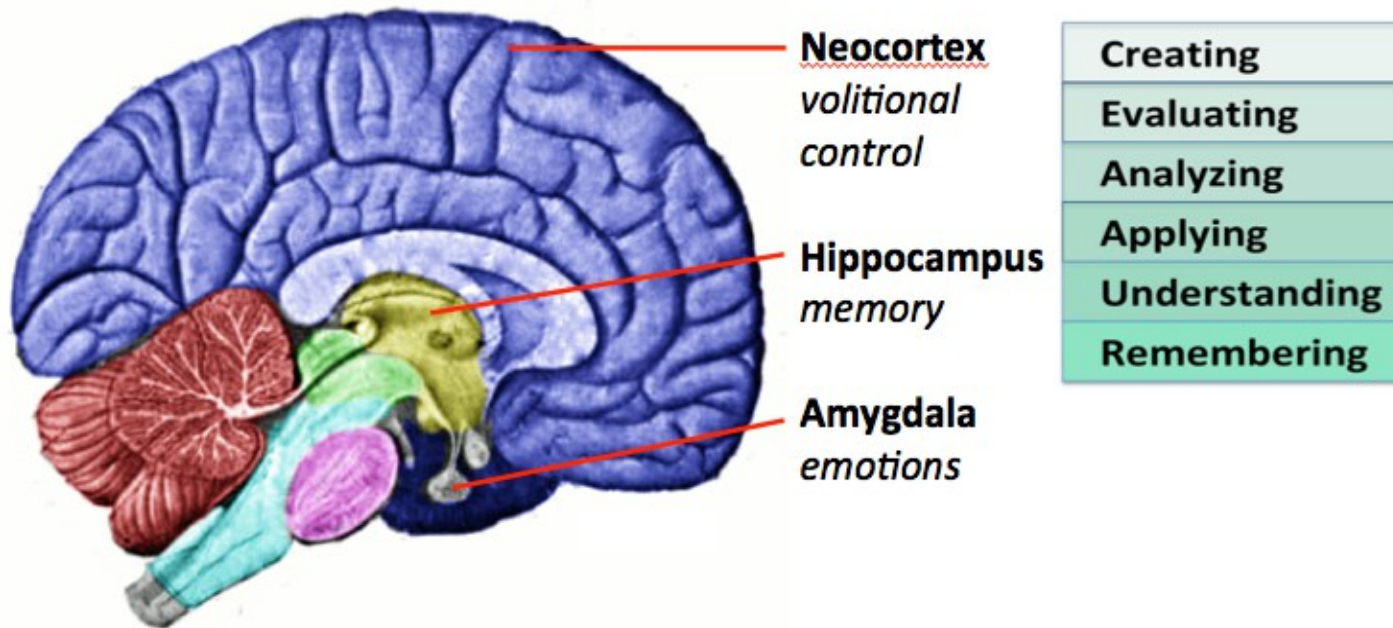
▼ Background: Train the trainer



Source: National Training Laboratories, Bethel, Maine

Hints

- ▼ Higher **Elaboration** = Higher Benefit = Less long time effort



Bloom's taxonomy, which describes cognitive tasks in ascending orders of complexity, appears to be supported by neuroscience research. Recruiting volitional control, memory, and emotions through active learning techniques increases performance.

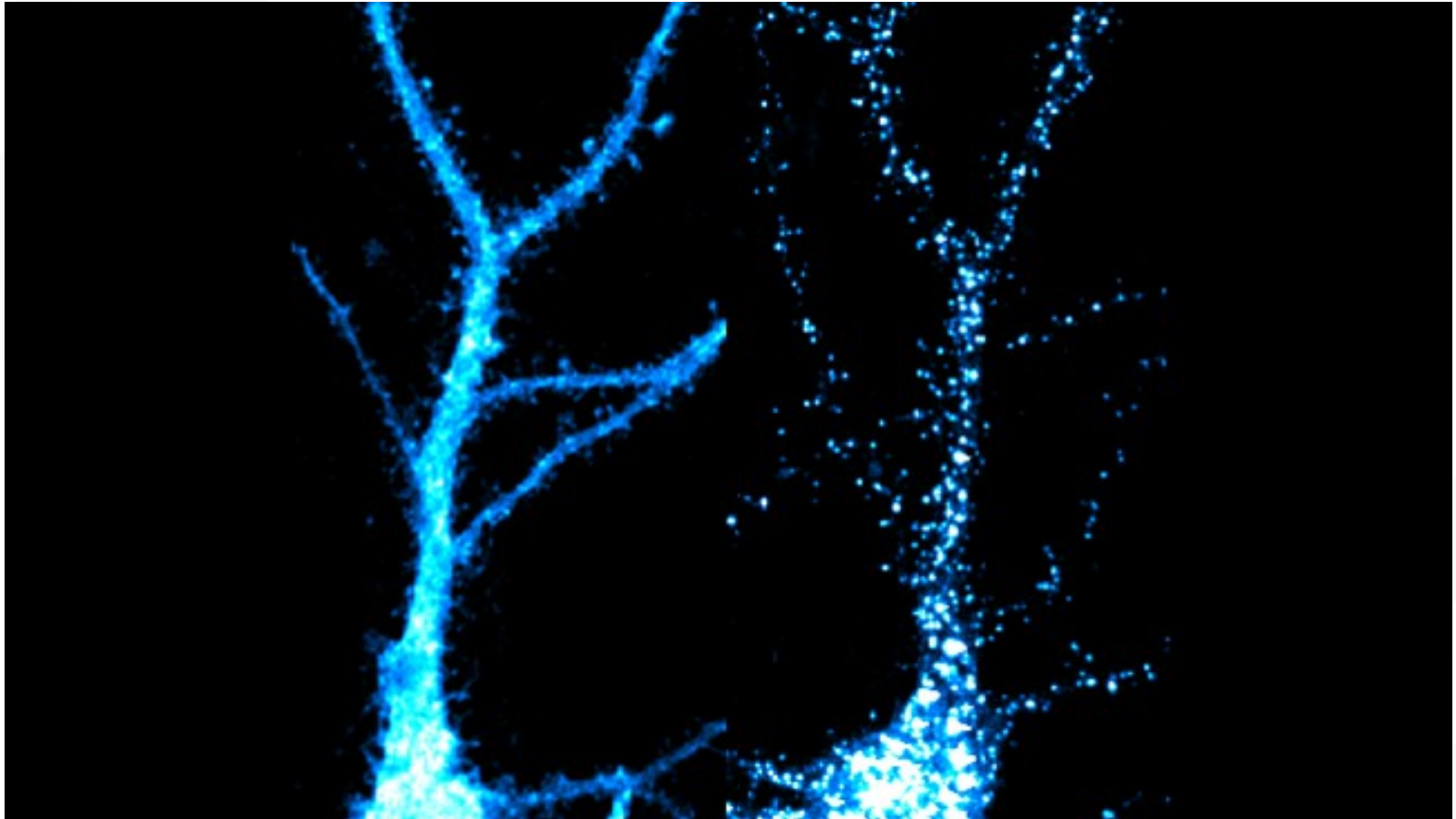
Brain image by Looie496 [Public domain], via Wikimedia Commons.

Verbs from Bloom's Revised Taxonomy of Learning Objectives in the Cognitive Domain, in Anderson, L. W. and David R. Krathwohl, D. R., et al. eds. *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Boston: Allyn & Bacon, 2001.

Source: <http://gsi.berkeley.edu/gsi-guide-contents/learning-theory-research/neuroscience/>

Motivation

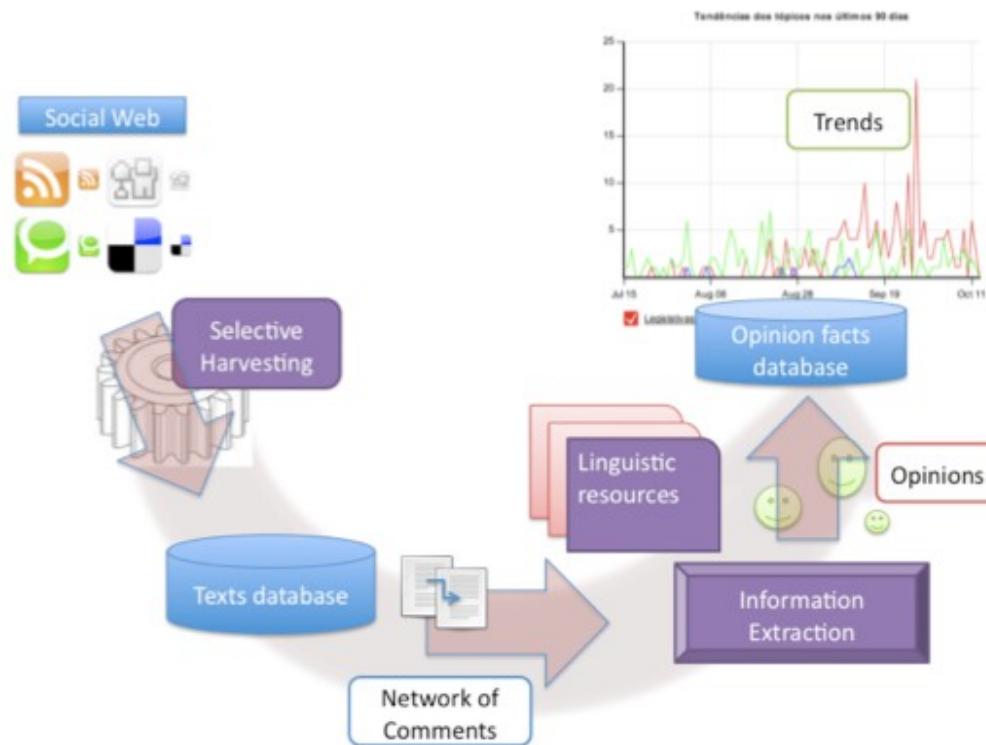
▼ Learning in your **brain**



Source: Scudder, et al. The Journal of Neuroscience, 2014.

Motivation

- Applications:
 - Opinion Mining: Max Zimmermann (PhD): Understanding and Monitoring Attitudes of Product Properties over Time

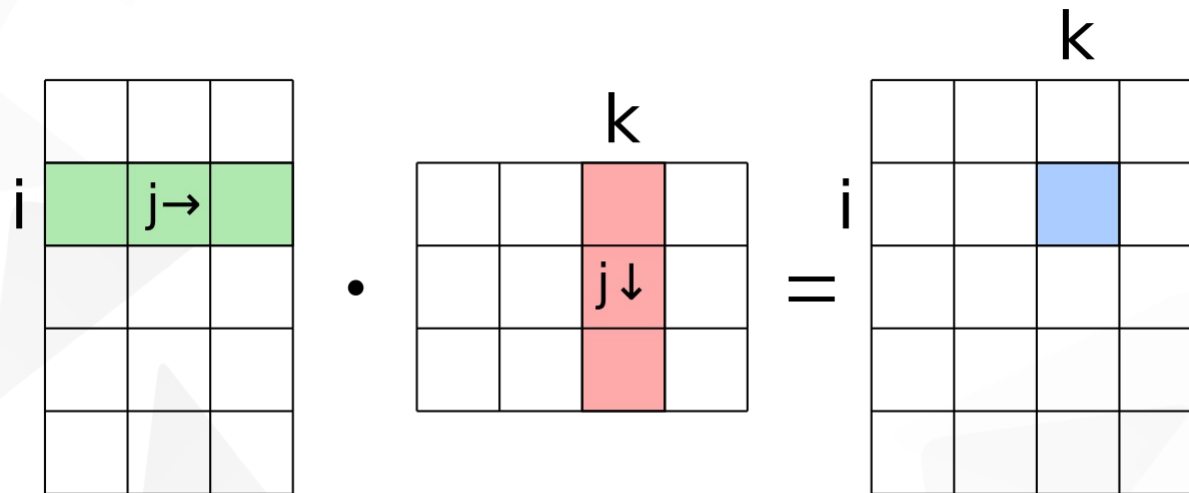


Source: <http://dmir.inesc-id.pt/project/POPSTAR>

Exercises

▼ Exercise 1-1 **Linear Algebra**

▼ Matrix multiplication

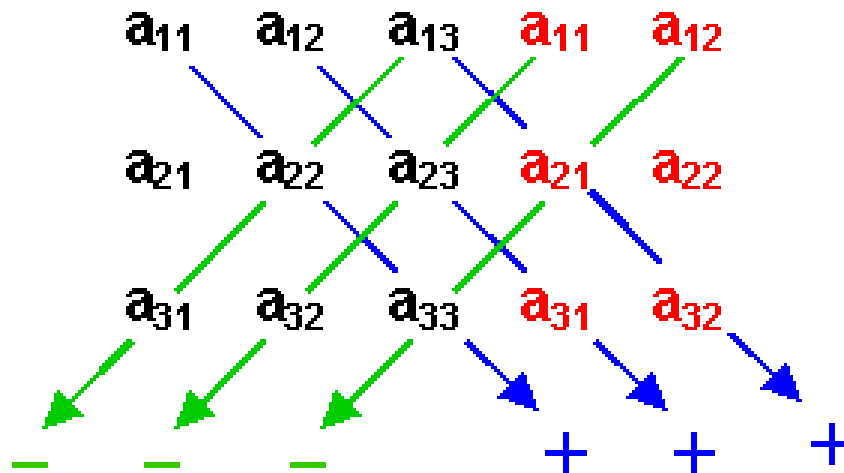


Source: <http://de.wikipedia.org/wiki/Matrizenmultiplikation>

Exercises

▼ Exercise 1-1 **Linear Algebra**

▼ Matrix determinant



Source: http://www.tf.uni-kiel.de/matwis/amat/def_en/kap_7/basics/b7_3_1.html

Exercises

▼ Exercise 1-2 **Vector Calculus**

▼ Standard scalar product

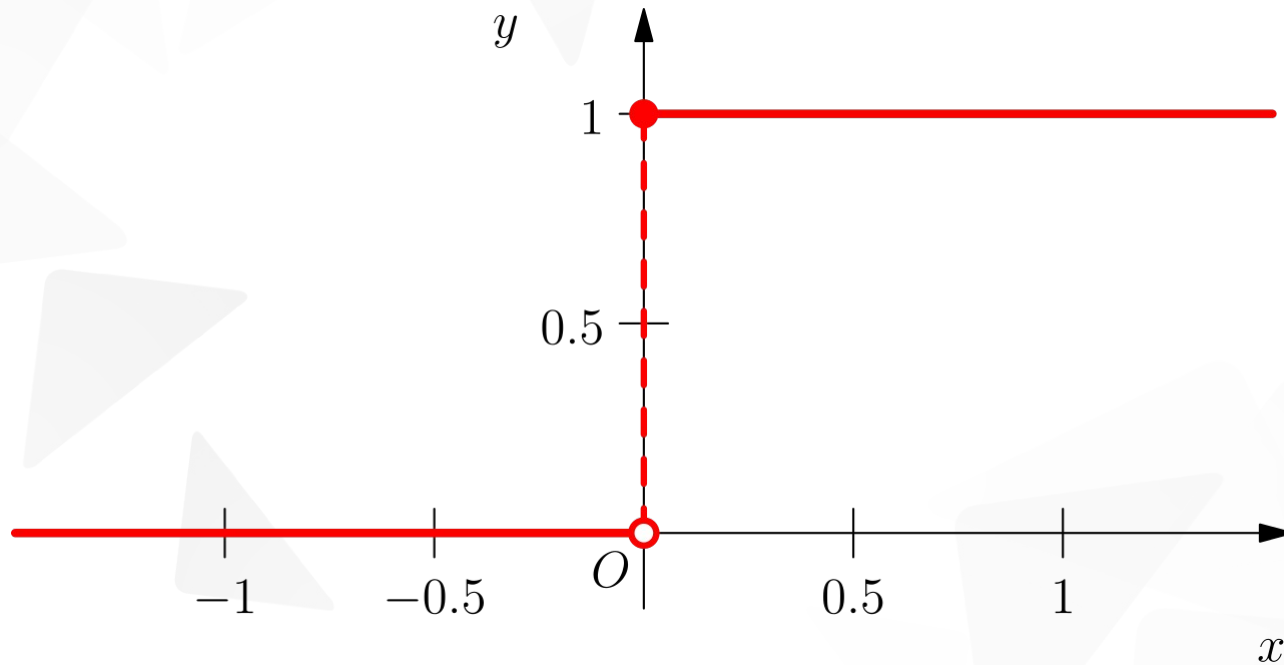
The diagram illustrates the standard scalar product of two vectors. On the left, a horizontal vector of four green squares is labeled with '1' on the left and 'n' on the right. In the middle, a vertical vector of four red squares is labeled with '1' on top and 'n' on the bottom. A dot operator is placed between the two vectors. To the right of the dot is an equals sign, followed by a single blue square labeled with '1' on top and '1' on the left, representing the scalar result of the dot product.

Source: wikipedia.org

Exercises

▼ Exercise 1-3 **Perceptron**

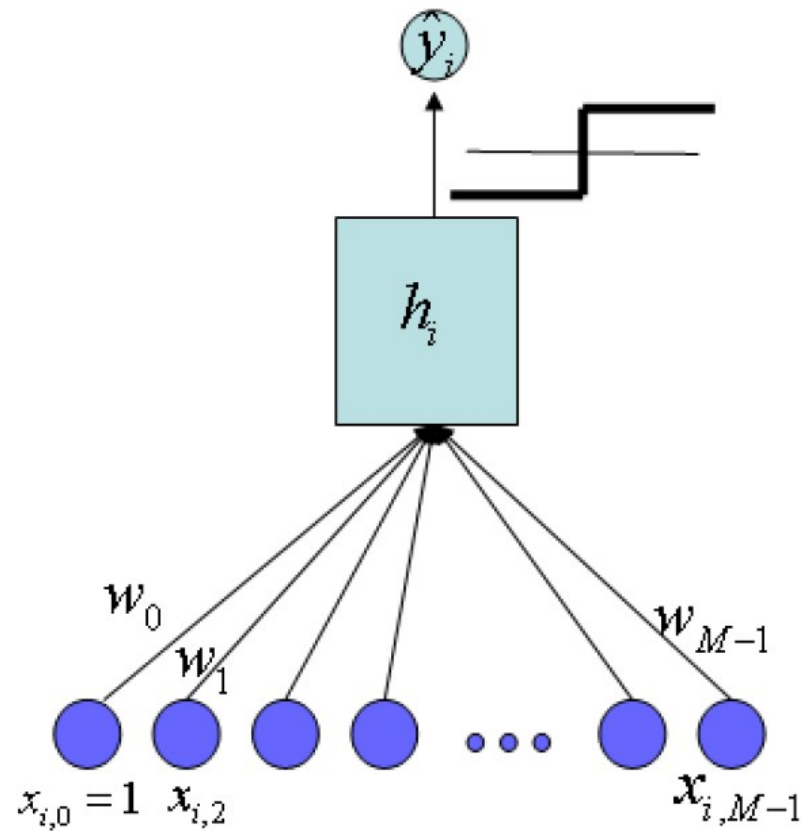
▼ Heaviside function



Source: wikipedia.org

Exercises

- ▼ Exercise 1-3 **Perceptron**
 - ▼ Activation function



Source: lecture

Thank you ...