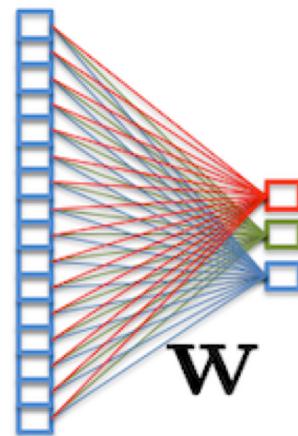


5IF - Deep Learning and Differentiable Programming

5.4 The experimental aspects of machine learning

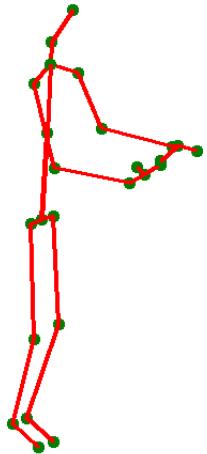


ML

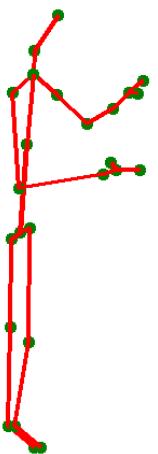
The science of machine learning has several aspects:

- Theoretical properties of models and algorithms:
 - Model complexity
 - Sample efficiency
 - Convergence properties of learning algorithms
 - Generalization bounds
- Experimental results when applied do concrete problems and data

Example 1: activity recognition

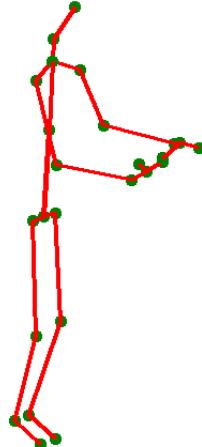


Reading

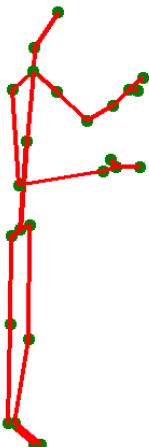


Writing

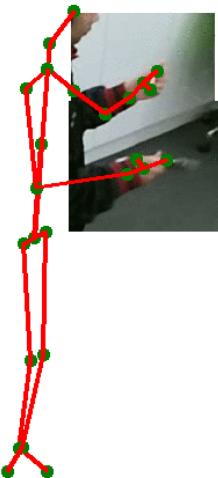
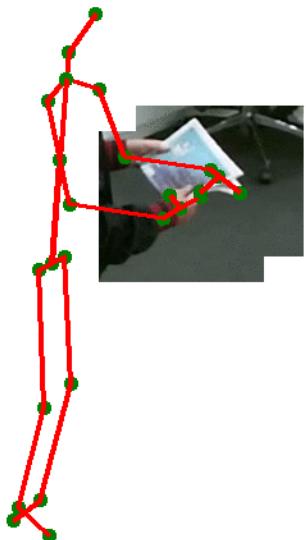
The role of articulated pose



Reading



Writing

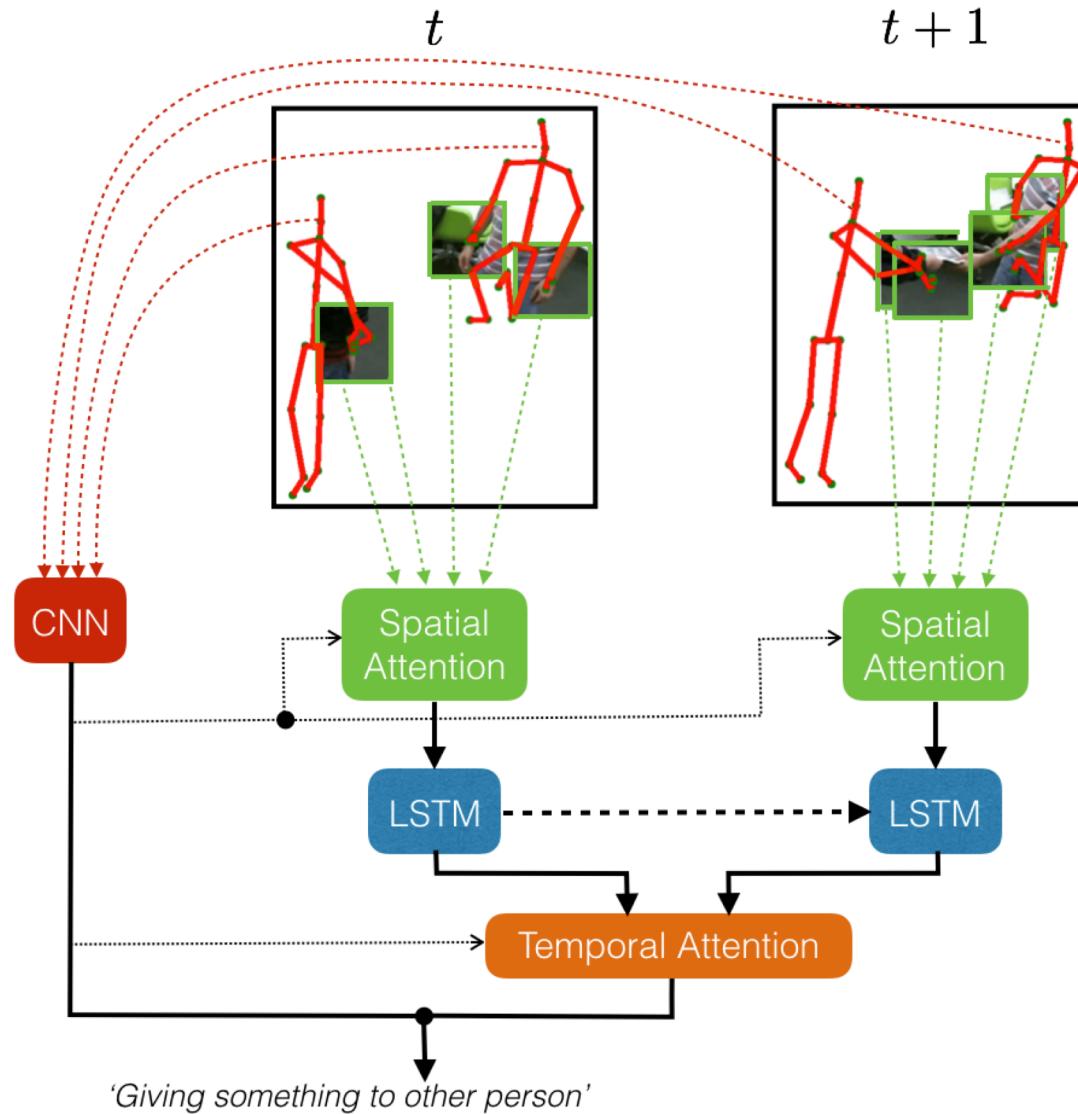


Appearance is
helpful

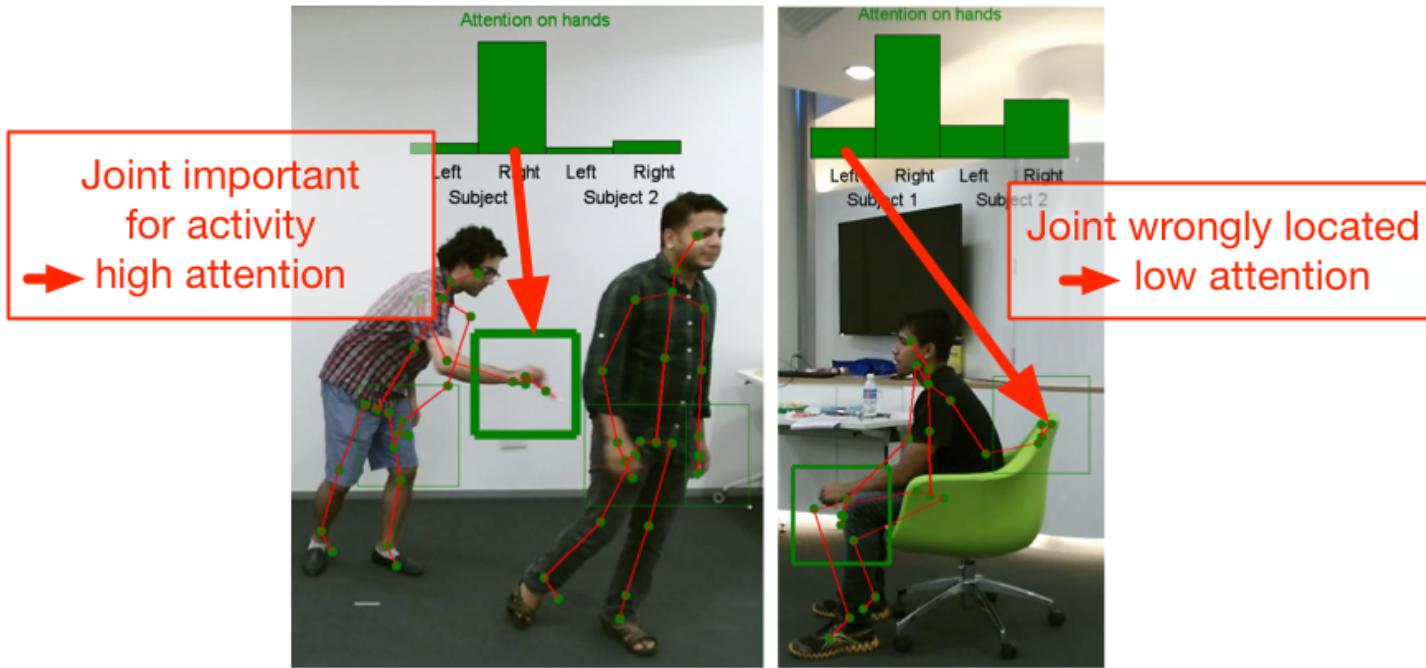
[Neverova, Wolf, Taylor, Nebout,
PAMI 2016]

[Baradel, Wolf, Mille, Taylor,
BMVC 2018]

Exemple : reconnaissance d'activités



Expected and unexpected results



[Baradel, Wolf, Mille, Taylor,
BMVC 2018]

Example 2: grid cells

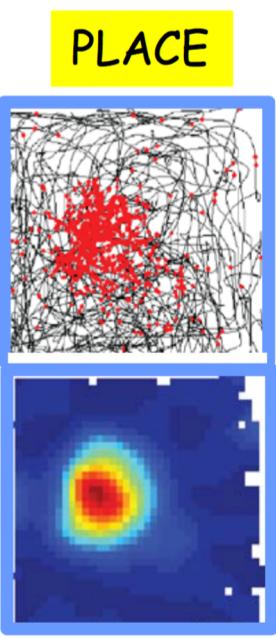
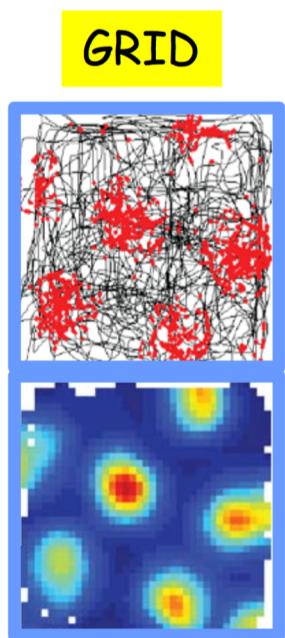


Photo: A. Mahmoud
May-Britt Moser
Prize share: 1/4

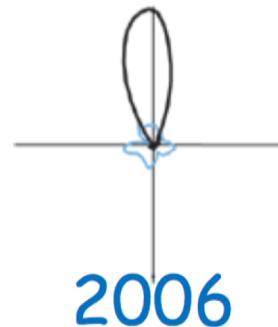


Photo: A. Mahmoud
Edvard I. Moser
Prize share: 1/4

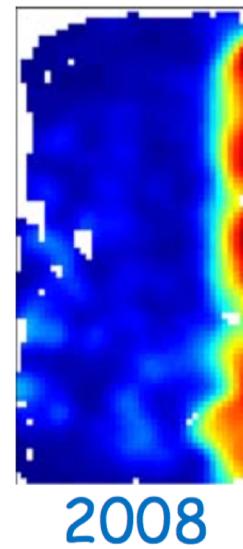
2014 Nobel Prize in Medicine



Head direction



Border cells



Example 2: grid celles

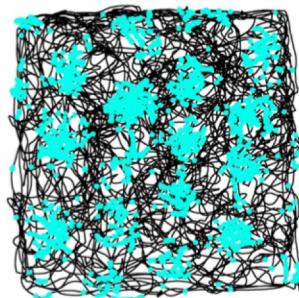


Photo: A. Mahmoud
May-Britt Moser
Prize share: 1/4

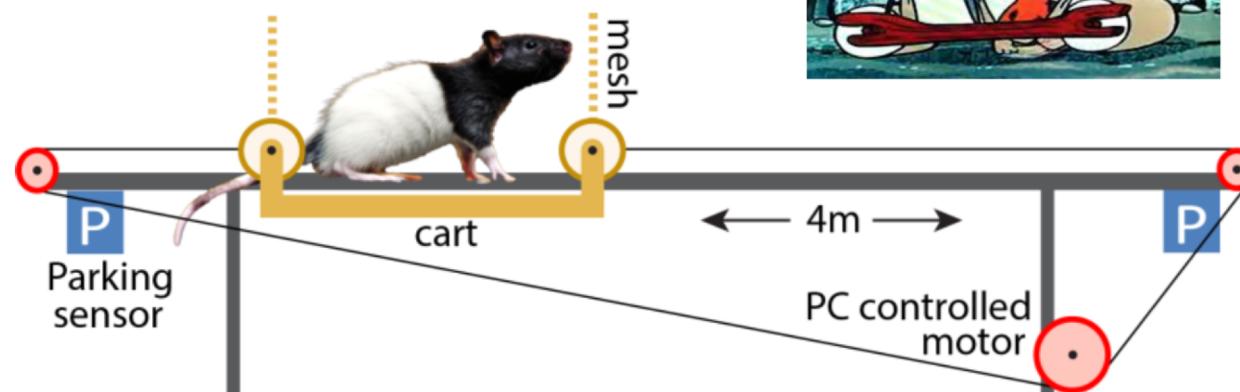


Photo: A. Mahmoud
Edvard I. Moser
Prize share: 1/4

2014 Nobel Prize in Medicine

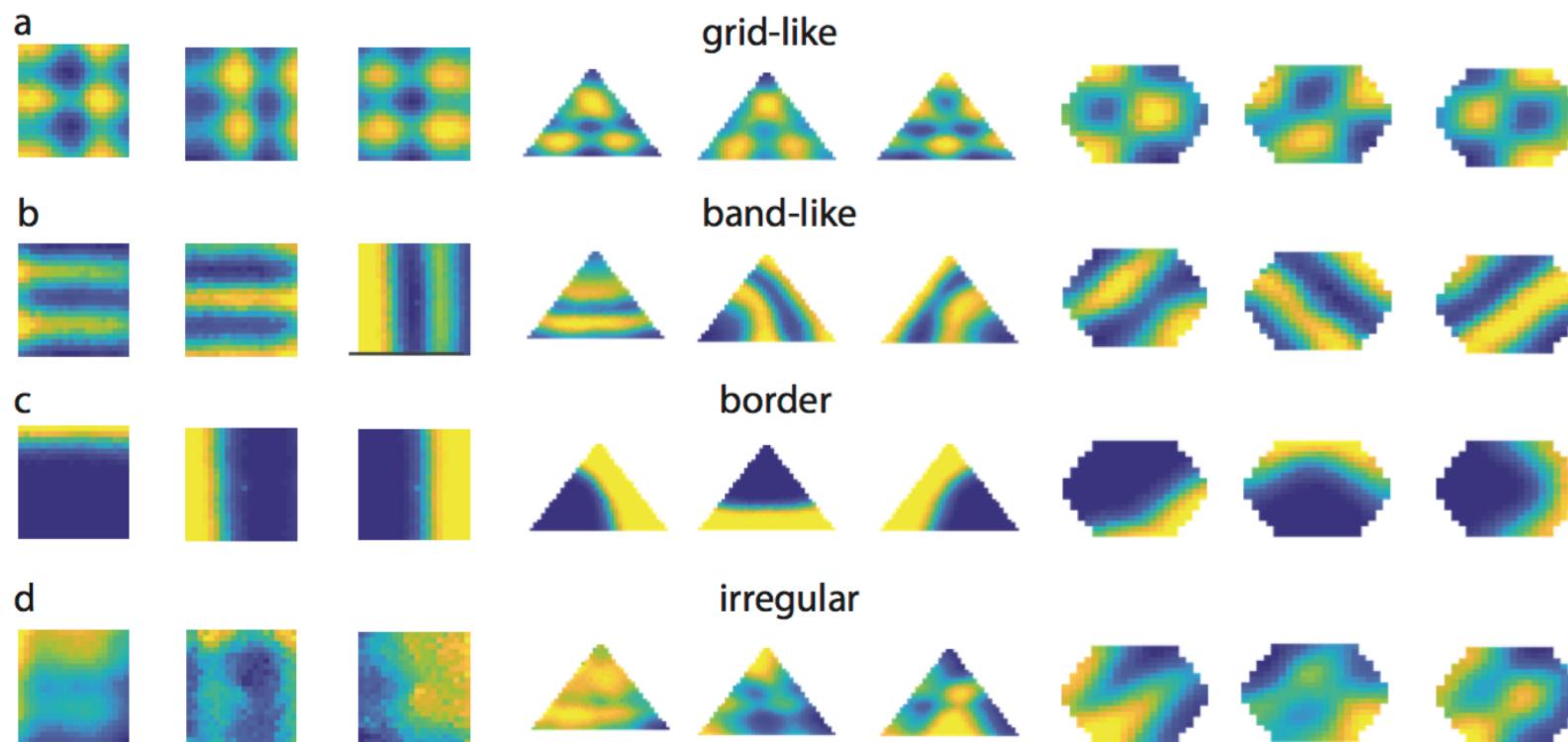


Speed cells are necessary
for updating the grid
pattern in accordance with
the animal's movement
(distance = speed x time)



AI vs. NI

2018 : discovery of the same cells in neural networks trained on similar tasks.



AI vs. NI

Emergence of the different types of cells in the same order.

