* feauture extraction

Y LeCun

Four missing pieces for AI (besides computation)

* Integrating Representation/Deep Learning with Reasoning, Attention, Planning and Memory
  + A lot of recent work on reasoning/planning, attention, memory, learning “algorithms”.
  + Memory-augmented neural nets
  + “Differentiable” algorithms
* Integrating supervised, unsupervised and reinforcement learning into a single “algorithm”.
  + Boltzmann Machines would be nice if they worked.
  + Stacked What-Where Auto-Encoders, Ladder Networks....
* Effective ways to do unsupervised Learning
  + Discovering the structure and regularities of the world by observing it and living in it like animals and humans do.

**Go deeper**

1. Convnet
2. RBM
3. Self organizing map
4. **Competitive learning**

**REVIEWS**

**Useful material**

**> ConvNets:** [**https://www.youtube.com/watch?v=FmpDIaiMIeA**](https://www.youtube.com/watch?v=FmpDIaiMIeA)

[**http://cs231n.github.io/convolutional-networks/**](http://cs231n.github.io/convolutional-networks/)

**(very useful in supervised learning)**

**Convolution-ReLU-Pooling**

**Pooling-> allows greater variance**

**> Auto-encoder: used to unsupervised feature extraction (see** [**https://www.youtube.com/watch?v=-CSii0dy98E**](https://www.youtube.com/watch?v=-CSii0dy98E) **min32 to min42)**

**However, i think that features are used in supervised learning techniques (such as “feature matrixes” in CNNs)**

**> Fully unsupervised**

**-> Deep belief Network (using RBMs)**

**-> Generative networks (they reconstruct “fake” images like auto encoders/decoders, ok, but how is this used for example in unsupervised clustering;;)**

**Περιεχόμενα Nupic (numenta)**

* **Challenges (5 points from Continuous Online Sequence Learning with an Unsupervised Neural Network Model)**
* **Σύντομη εισαγωγή σε neuroscience, τύπους συνάψεων (basal,apical, proximal) και λειτουργία τους, mapping στο HTM μοντέλο**
* **SDRs**

1. **Μεγάλη χωρητικότητα αν και sparse**
2. **Noise tolerance (χαμηλό false positive χρησιμοποιώντας κατάλληλο threshold)**
3. **Subsampling (ακόμα και έτσι χαμηλό false positive)**

* **Spatial pooler**
* **Temporal pooler (example with letters sequence)**
* **Simulation and comparison to previous models**