History of Vision: My own perspective: Vision and Learning

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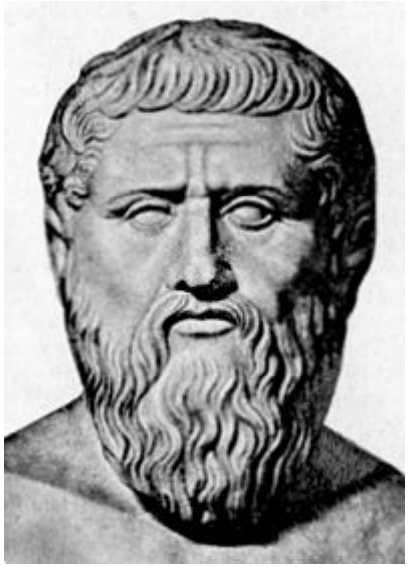
First Vision work?

Plato (427-347 v.Chr): Allegory of the cave (Höhlengleichnis)



Outline

- My Private History in Vision
- Role of Conferences (ICPR, ECCV, CVPR, ICCV, NIPS) and their relations
- Role of Learning in Vision
- Why Historic considerations

My own History

I was a Neural Network guy

- Goal was to use NN for Protein Folding
  - Database was hard to obtain

- At the same time start tree classification work with Axel (Boku)
- Worked nicely → ÖAGM Paper (Best paper award)
- Prob. first Austrian work on NN for a vision application

→ Diploma

- NN Application to Landcover classification → Journal paper (IEEE GRS)

I was still a NN guy

My own History

Move to PRIP

- Still NN focus but now looking at the relation to Vision

→ Pyramids <–> Hierarchical Neural networks
→ Visual Attention
→ Autoassociators → PCA (NIPS Paper)
→ PhD Thesis

NN is just a funny way of doing statistics

– Theory is important
– Statistical Pattern Recognition → Visual Learning

My own History

Still at PRIP

- Ales joined and we shared an office
- Ales had MDL (Model Selection)
- MDL and Neural Networks
- MDL and PCA → Object Recognition work
- PCA → Subspace Methods
- Object Recognition → Robust Methods
- PCA → AAM → Medcine
- NN-PCA (Oja) → On-line methods (with K. Hornik)

My own History

Move to Graz

Range of methods we are currently dealing with

Subspaces,
Robustness,
On-line learning
Local Recognition
AAM
etc.

A Look at Conferences

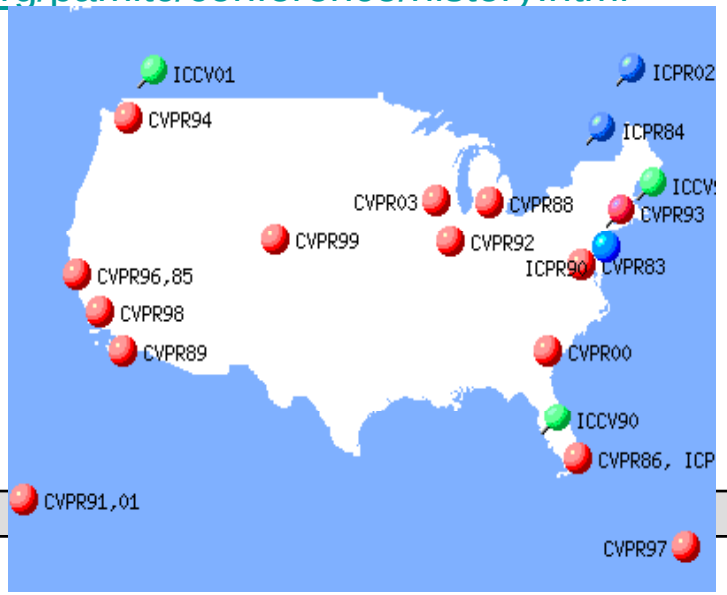
How have things developed:

NIPS: since 1987 (premium Neural Computation conference)

CVPR: since 1983 http://tab.computer.org/pamitc/conference/history.html

Attendees: Started with ~300, now > 1200

Raise was around 2000



Conferences

ICCV: First 1987 London

similar pattern as for CVPR

ICPR: Started as IJCPR 1973 Washington

since 1980 ICPR

~ 1000 participants (Vienna was 1996 the first time > 1000)

ECCV: Started 1990 France (Faugeras)

since Copenhagen 2002 ~ 600 participants (before ~200-300)

Topics

NIPS: Early years:

Diverse topics: Hardware, Biological, Organization Principles of NN, Character Rec., Object Recognition ….

1991 NIPS was discovered by Vision researchers:

Pentland, Ulmann, Shashua, Chellapa, Darrel, …

also a lot of unsupervised feature learning

1992 Reinforcement Learning, …

1993 MDL, PCA

Topics

NIPS:

1995 Learning, SEEMore Paper, Boosting
1996 Support Vector, Bayesian, Ensemble Methods
1998 Kernel PCA, Boosting
1999 Graphical Models, Gaussian Processes
2001 Spectral Clustering
2002 Semi-supervised, Self-supervised
2003 Markov Decision Processes (MDP, POMDP)
2004 Randomized Forests, Learning f. Tracking
2006 Quite some vision researchers
2007 Still a lot of boosting, ????

General Observations

- Certain topics are en-vouge for a time
- Some stay longer
  - Bayesian
  - Boosting, SVM, Kernels, ….
  - MCMC, Variational Inferences
  - ICA and other subspaces
  - Spiking
- Typical smaller problems (8x8 images …)
- Not much emphasize on speed
- Lots of theoretical

CVPR Topics

CVPR (US ÖAGM):

1991: Stereo, Motion, No Learning, Hardly any PR

1994: Eigenspaces, Robust Methods, Recognition, MDL, Visual Attention

1996 Faces, Eigenspaces, Reinforcement

1998 Bayesian, MRF

2000 Catadioptric, Boosting, GraphCuts, Local Recognition

2003 Boosting, SVM, Variational, Mean-Shift

2004 Wide-baseline ←→ Recognition, Graphical Models, Bayesian

2006 Categorization, Kernels, Boosting

General Observations

- Certain topics are en-vouge for a time
- Learning is becoming increasingly important
- Pattern recognition is important
- Much emphasize on efficiency
- Large scale problems

- There is an influence from NIPS

ECCV

ECCV was a long time dominated by Geometry and Theory up to 1998

In 2000 (Dublin) a change happened

In 2002 Copenhagen lots of Statistical PR (~half)

In 2006 Graz geometry was no longer prominently present

Learning in Vision

Learning in Vision:

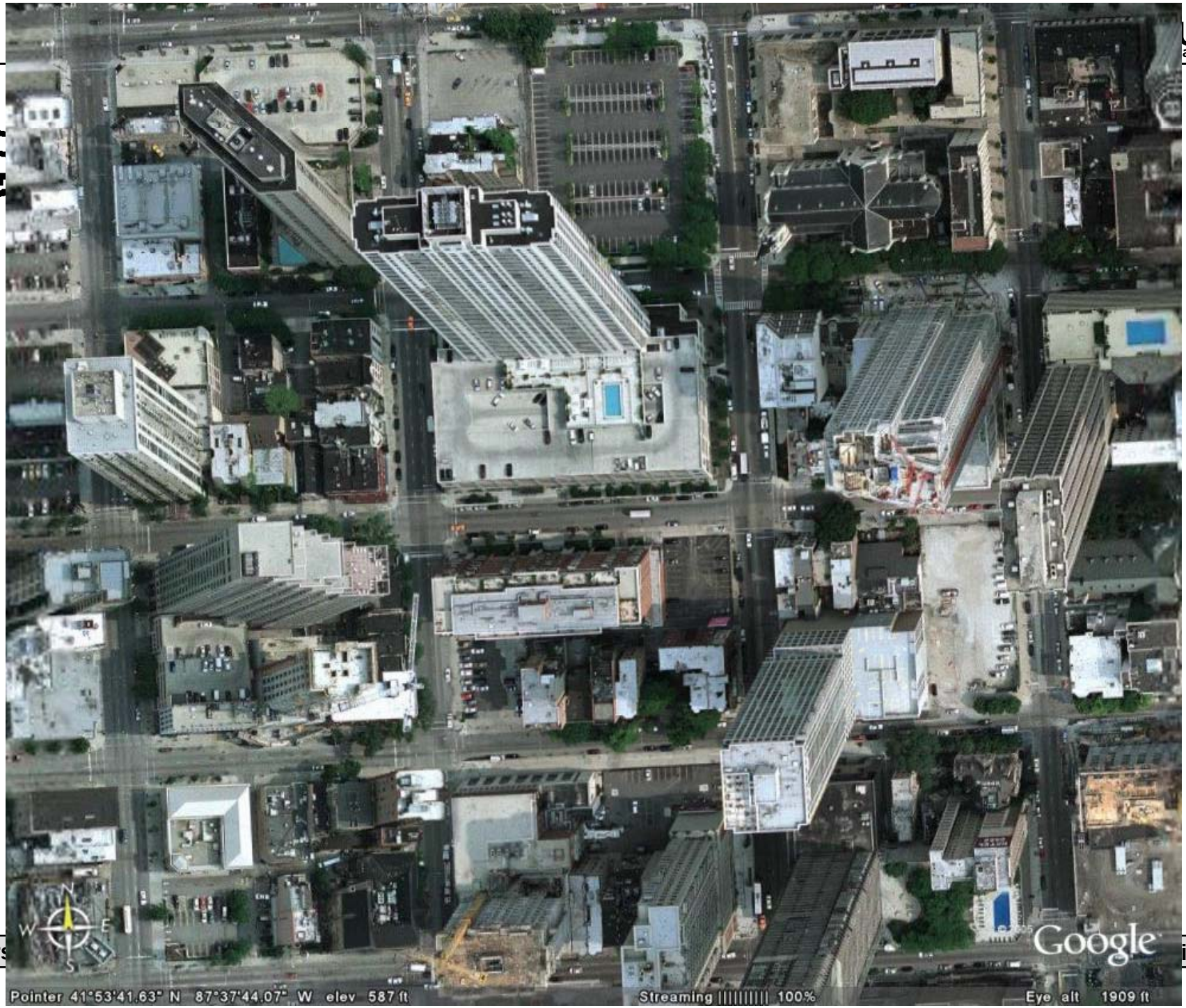
- Pattern Recognition → Subspaces, SVMs, Boosting, …
- Recognition: Need for learning to solve large scale vision problems
- Trend was initated by NN (so it was good that I was a NN guy ;-)

Why History

1. To make Helmut happy

2. What do we learn

   – Trends
   – New upcomming Topics (look what it en vouge in NIPS)
   – Understand the relations between conferences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