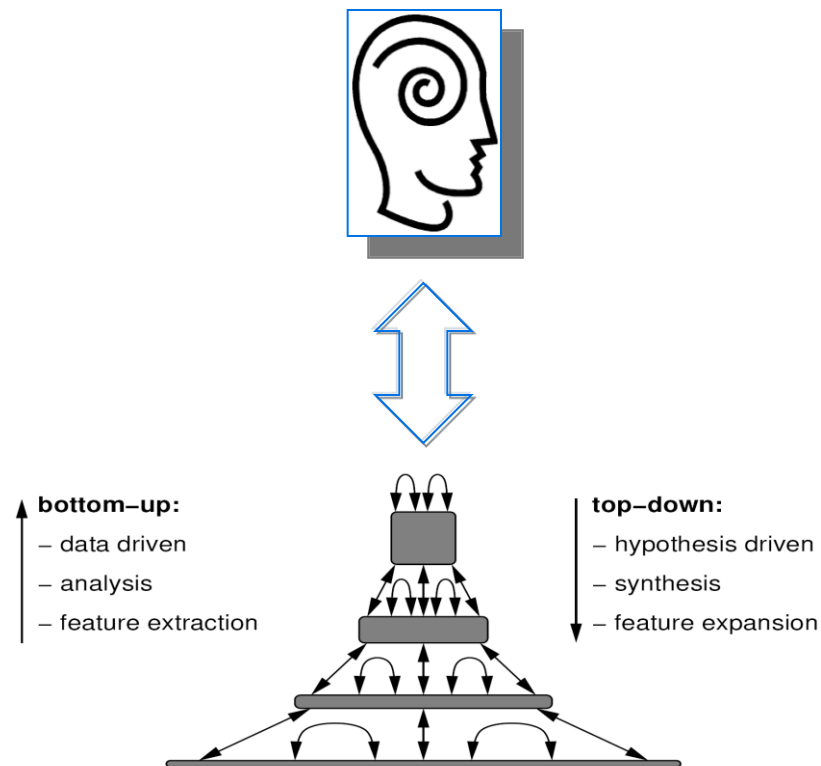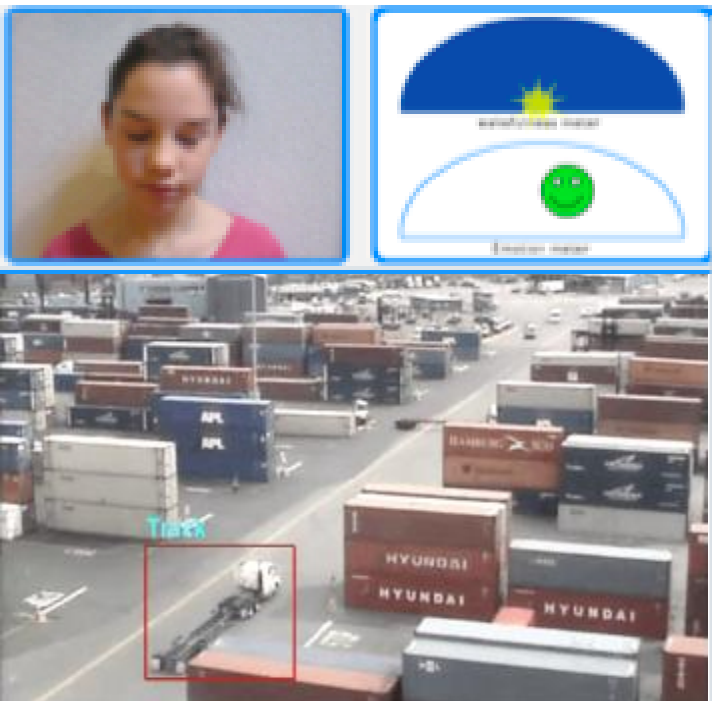# Binatix, Inc. Snapshot

- Binatix develops Sense Making software based on machine learning algorithms that mimic the human brain

- The challenge: <u>Data Explosion</u>;
  - Too much data, too few people. How to make sense of it all?

- The solution: HDRN– the world's strongest deep machine learning platform for large-scale data sets.
  - Robust pattern inference / classification
  - Temporal (behavioral) recognition
  - Data fusion across multiple modalities
 - Autonomous learning (not rules-based)
  - Fast and resource efficient

bottom–up:
- data driven
- analysis
- feature extraction

top–down:
- hypothesis driven
- synthesis
- feature expansion

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Spatial & Temporal Recognition Demos

Human-like nature of HDRN:

- ☐ These spatial pattern recognition demos:
  - ■ Learned w/o human assistance
  - ■ No feature extraction phase
  - ■ Robust to lighting, viewing angle, size
- ☐ Temporal recognition/inference:
  - ■ Spoken language identification demo in the presence of heavy noise & reverberations
- ☐ Spatiotemporal demo under dev.
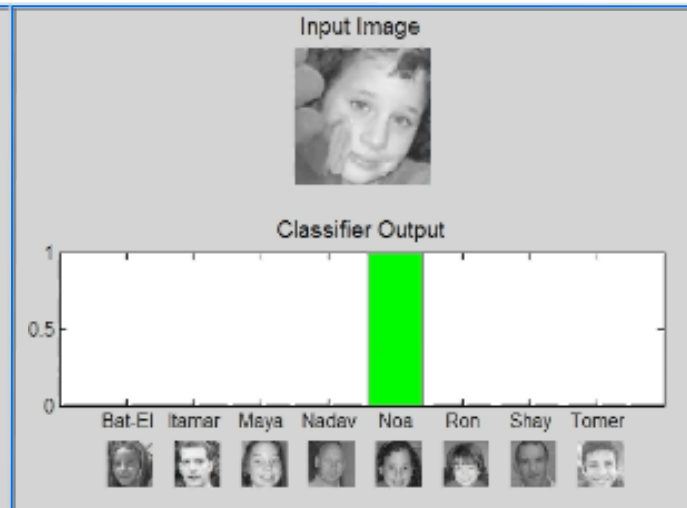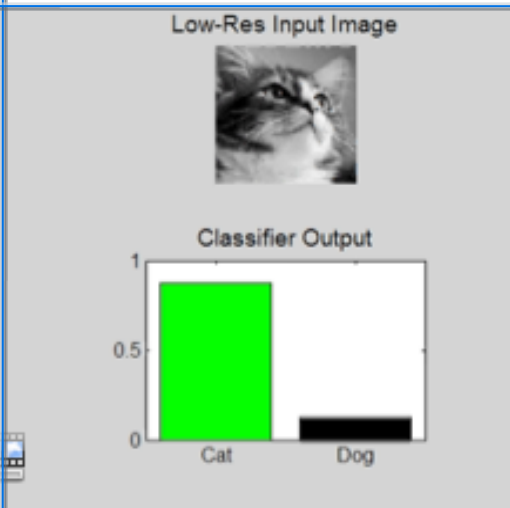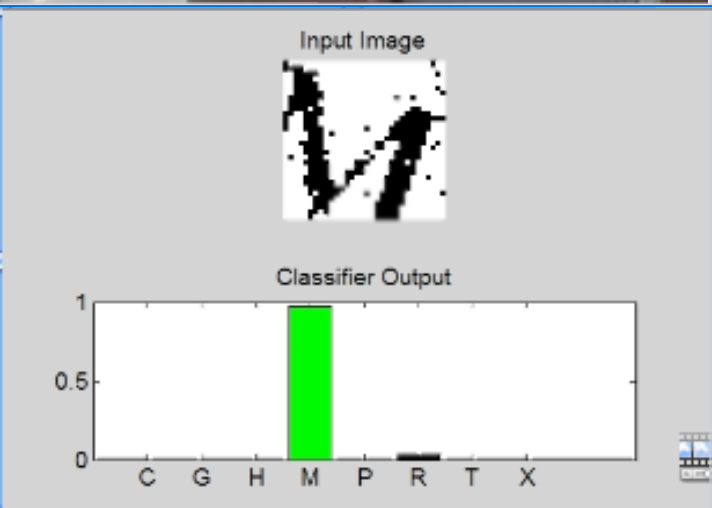
Overcoming the *Curse of Dimensionality*

- ☐ Mainstream approach: feature extraction for dimensionality reduction
  - ■ Always application-specific
  - ■ Typically degrades when noise/distortions are present

- ☐ Binatix approach: hierarchical machine learning architecture comprising of identical cortical circuits
  - ■ Salient features, representing regularities, are formed from raw input (e.g. pixels)
  - ■ Invariant features are utilized for "understanding"
  - ■ Robust in presence of noise and other distortions
  - ■ Application independent
  - ■ No need for any feature extraction

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Spatiotemporal information representation

☐ A Cortical circuit represents both spatial and temporal information

☐ Hierarchy of identical cortical circuits captures short & long-term temporal dependencies
  - ■ e.g. recognize regularities separated by large time intervals
  - ■ Considers the spatial properties and their evolution over time

☐ Invariant to common distortions (e.g. in images – noise, lighting conditions, viewing angle, perspective, other transforms)

☐ No need for any pre-training or parameters tweaking

☐ GPU-based implementation offers great scalability

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Areas of Interest & Contact Information

Good targets for HDRN:

- ☐ Salient features are hard to define:
  - ◼ Human can recognize a pattern but find it hard to articulate
- ☐ Myriad of data from many sources:
  - ◼ Human can no longer cope. Parallel use of GPUs and servers
- ☐ Multi-modal large dataset
  - ◼ Find patterns, analyze, predicts

Binatix Interests:

- ☐ Apply our research to a real-life important problem
- ☐ Join a winning team as a sub

THANK YOU

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