Creative Tech Week 2016
Arts Hub - New York

Do Androids Dream?

Panel

May 5, 2016 4:45 – 5:30 PM

github.com/DoAndroidsDream

Image Credit: http://www.themorgan.org/drawings/item/250313

Welcome

- Motivating question is "*What can we learn about visual art and human imagination from deep neural networks*"
- Our panelists:
  - Gizem Küçükoğlu: vision researcher at NYU will summarize brain models of visual perception/cognition.
  - Dr. Matt Zeiler: founder of the AI Vision company Clarifai.
    - Matt's deep neural network visualization techniques drove major breakthroughs in object recognition accuracy, winning for Clarifai the top five places in the 2013 ImageNet competition (beating entries from top AI research centers like Google, Microsoft, etc.
  - Dr. Nick Lambert, Art and culture historian and a major figure in CTW 2016.
  - Cassidy Williams – Developer Evangelist at Clarifai

Background Image Credit:
https://upload.wikimedia.org/wikipedia/commons/a/ad/De_Alice%27s_Abenteuer_im_Wunderland_Carroll_pic_24.jpg

Machine Vision History

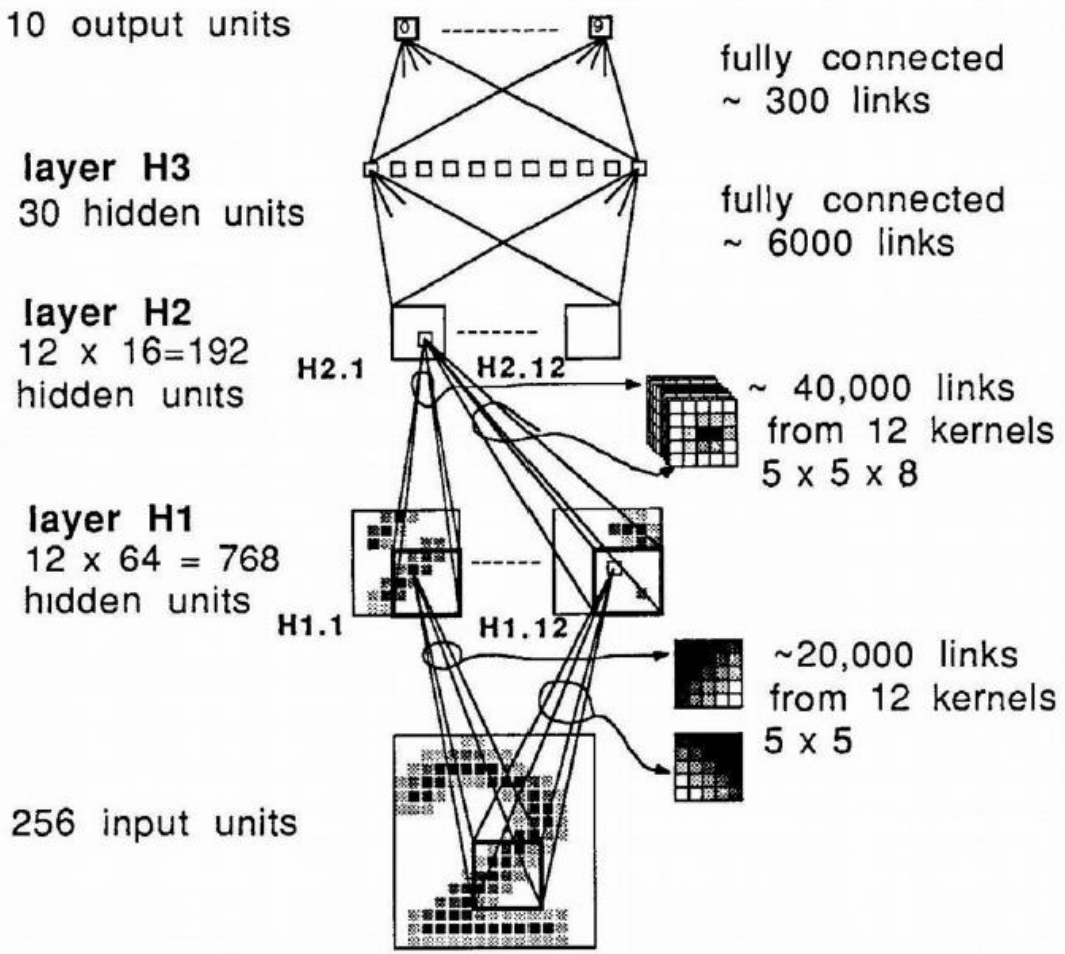
- Classic: Human specified visual features
  - Robots picking up well-defined objects in factory environment
  - Hand-crafted convolutional filters to detect faces in an image
- Since 1980's: Discovering features via Neural Nets
  - Object Detection & Classification
  - Visualizing Discovered Features

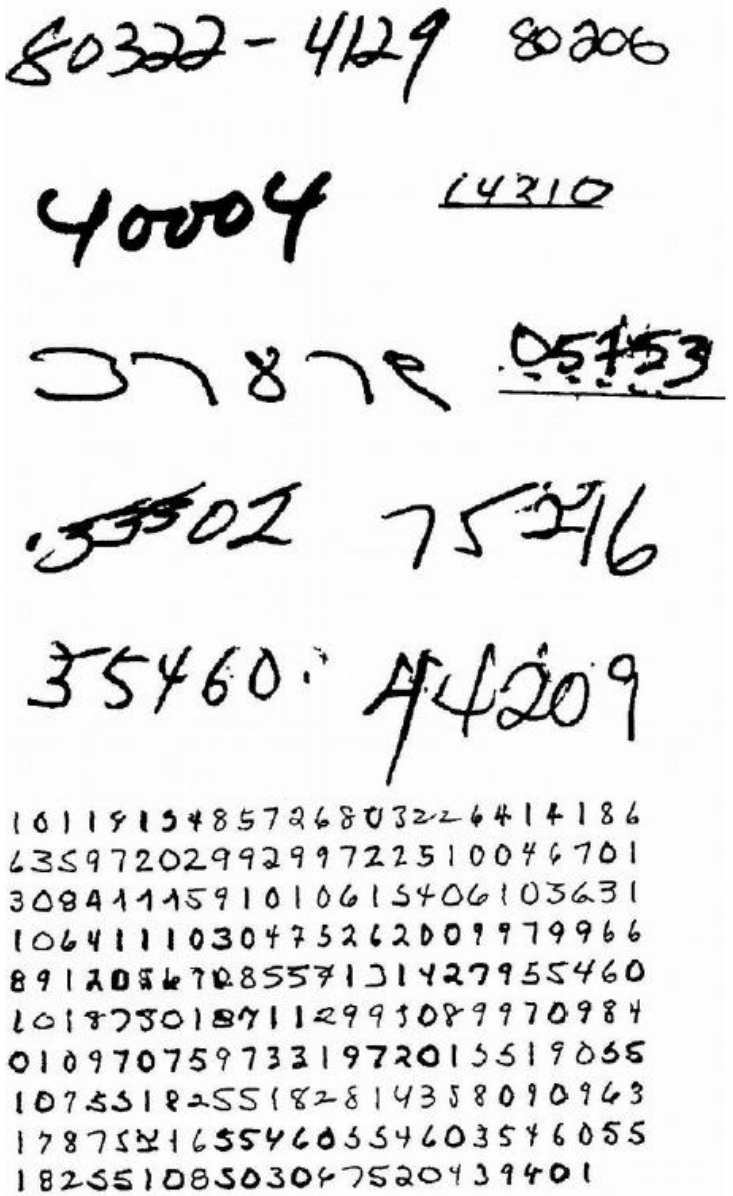
First "Real" ConvNets at Bell Labs [LeCun et al 89]

Trained with Backprop.

USPS Zipcode digits: 7300 training, 2000 test.

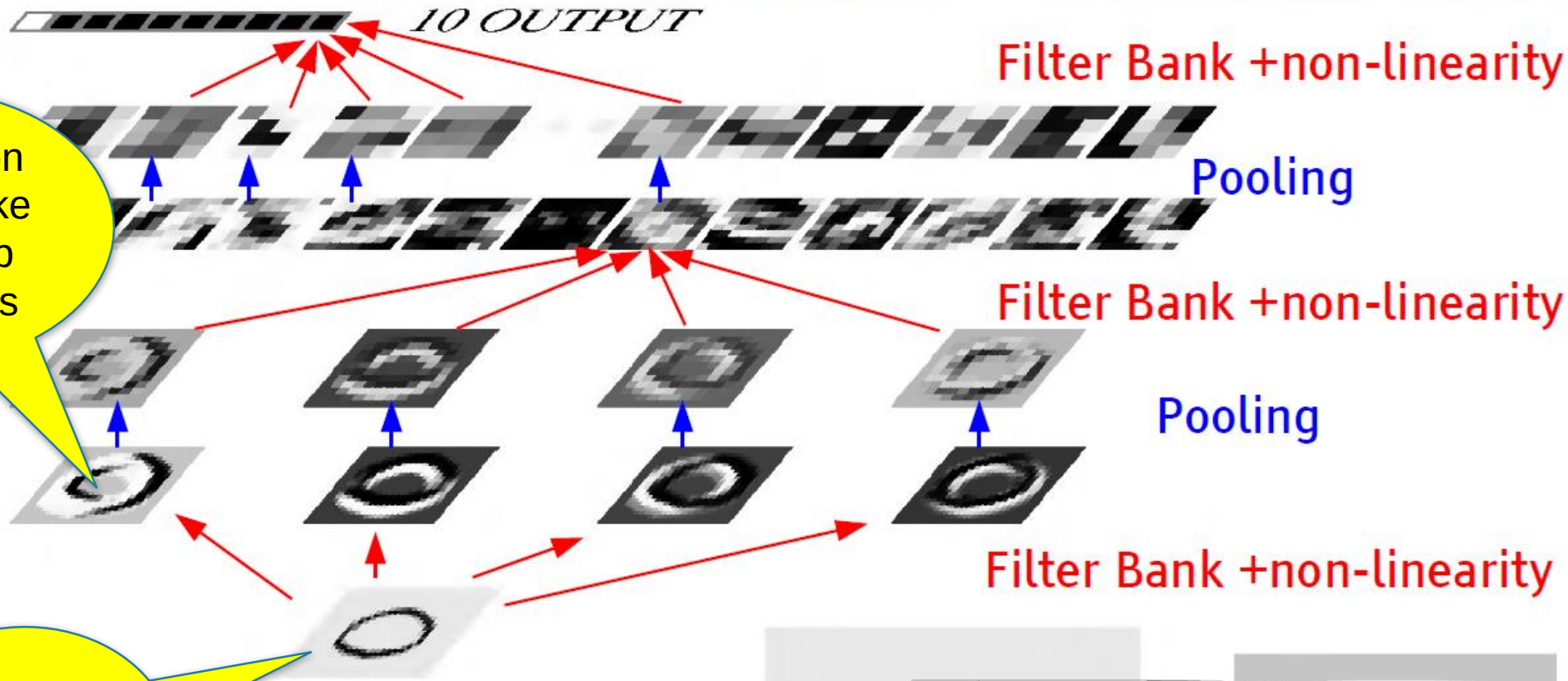
Convolution with stride. No separate pooling.





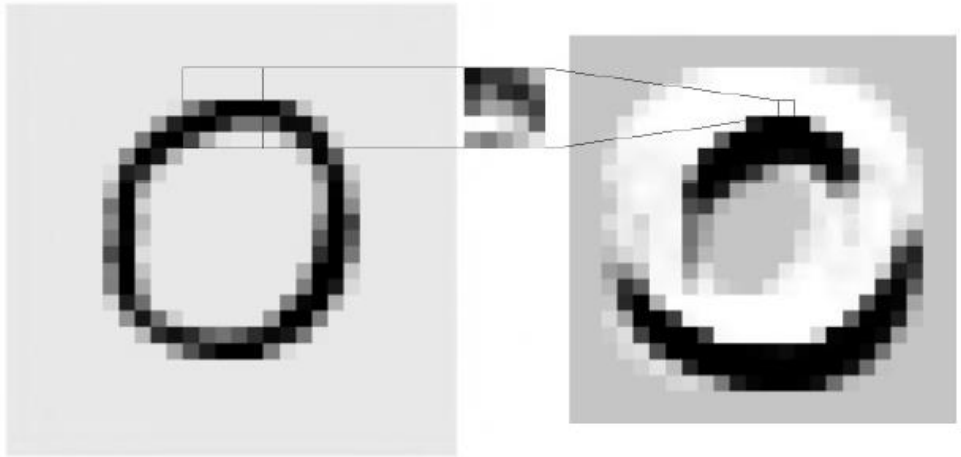
ConvNet with separate pooling layer [LeCun et al 90]

Y LeCun



Convolution 1st Layer like Photoshop Edge filters

Input scanned Image

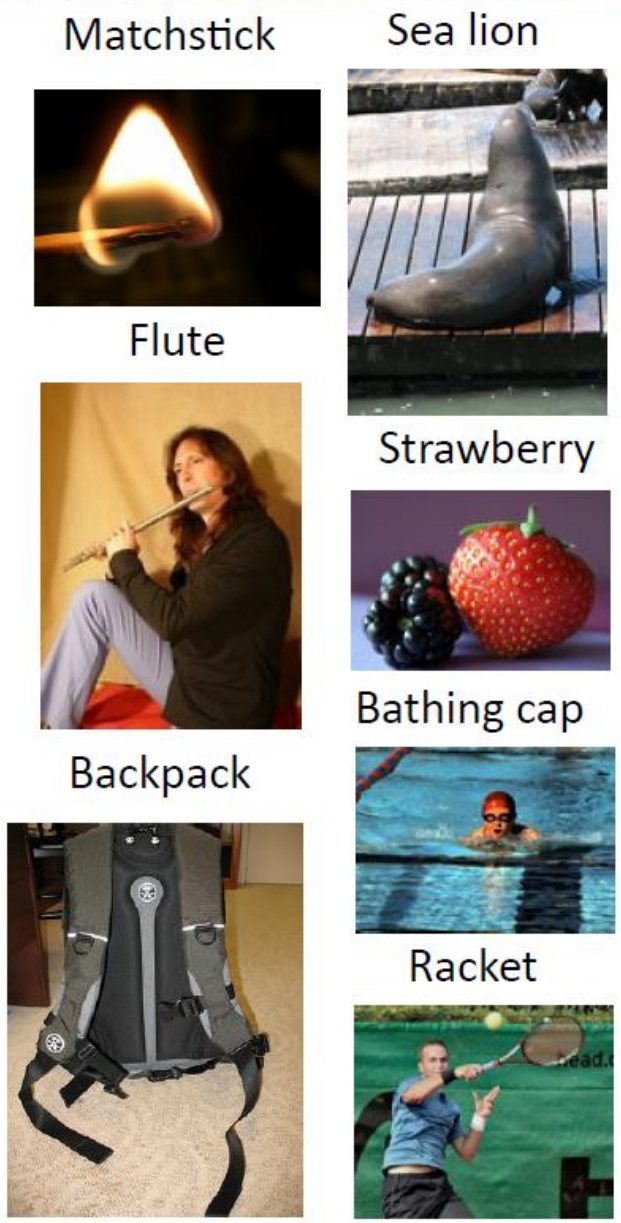


LeNet1 [NIPS 1989]

Then., two things happened...

- The ImageNet dataset [Fei-Fei et al. 2012]
  - 1.2 million training samples
  - 1000 categories

- Fast Graphical Processing Units (GPU)
  - Capable of 1 trillion operations/second



The New York Times

TECHNOLOGY

How Many Computers to Identify a Cat? 16,000

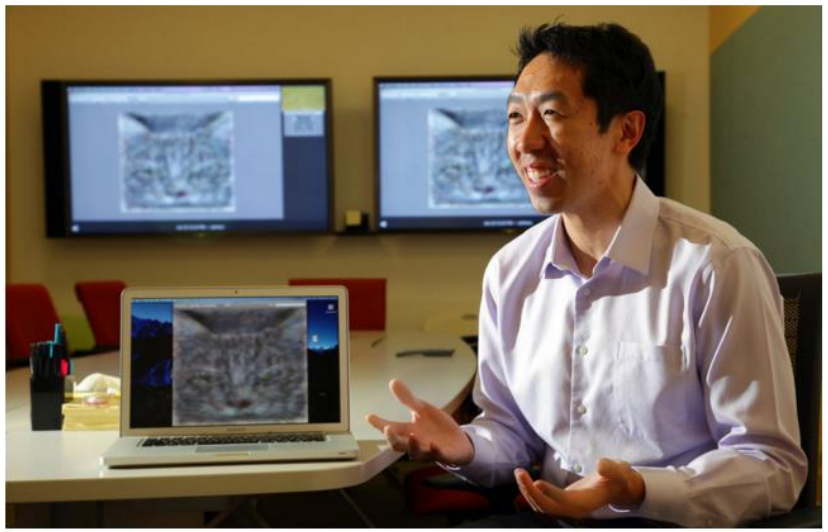
By JOHN MARKOFF JUNE 25, 2012

An image of a cat that a neural network taught itself to recognize. Jim Wilson/The New York Times

MOUNTAIN VIEW, Calif. — Inside Google's secretive X laboratory, known for inventing self-driving cars and augmented reality glasses, a small group of researchers began working several years ago on a simulation of the human brain.

There Google scientists created one of the largest neural networks for machine learning by connecting 16,000 computer processors, which they turned loose on the Internet to learn on its own.

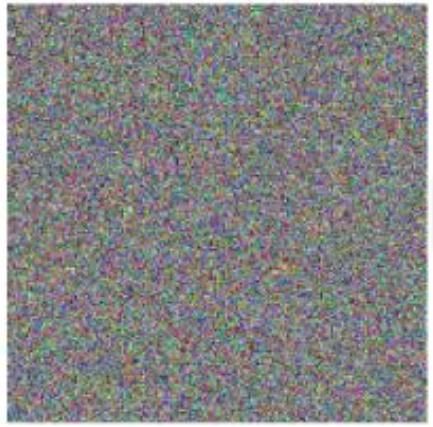
Presented with 10 million digital images found in YouTube videos, what did Google's brain do? What millions of humans do with YouTube: looked for cats.



Andrew Y. Ng, a Stanford computer scientist, is cautiously optimistic about neural networks. Jim Wilson/The New York Times

"This is the hottest thing in the speech recognition field these days," said Yann LeCun, a computer scientist who specializes in machine learning at the Courant Institute of Mathematical Sciences at New York University.

NY Times - Unsupervised Learning – June 25, 2012



optimize
with prior

Hartebeest

Measuring Cup

Ant

Starfish

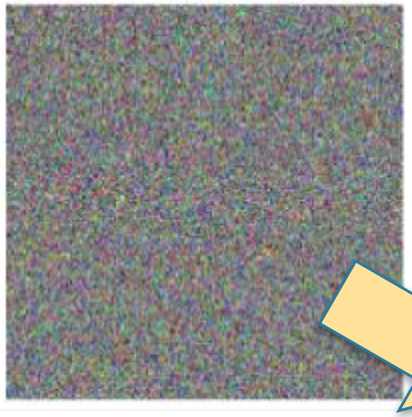
Anemone Fish

Banana

Parachute

Screw

Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015



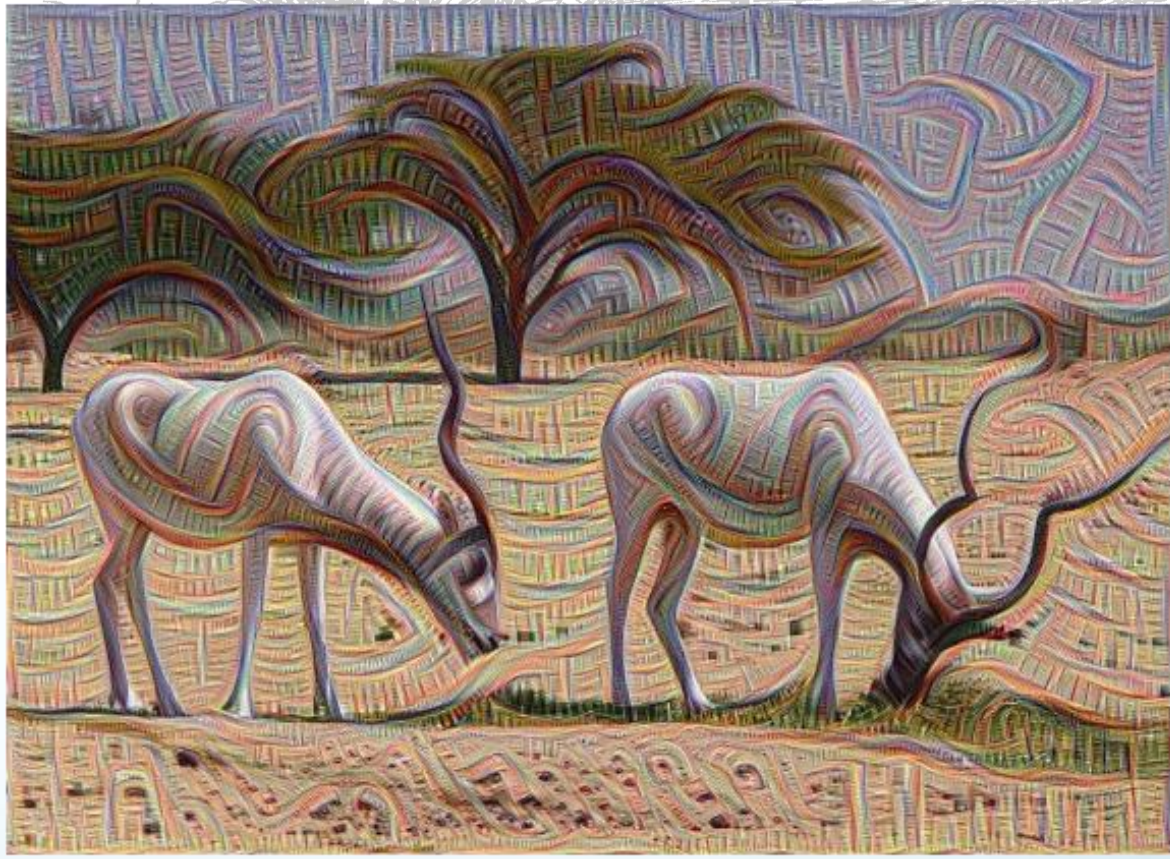
optimize
with prior




Dumbbells

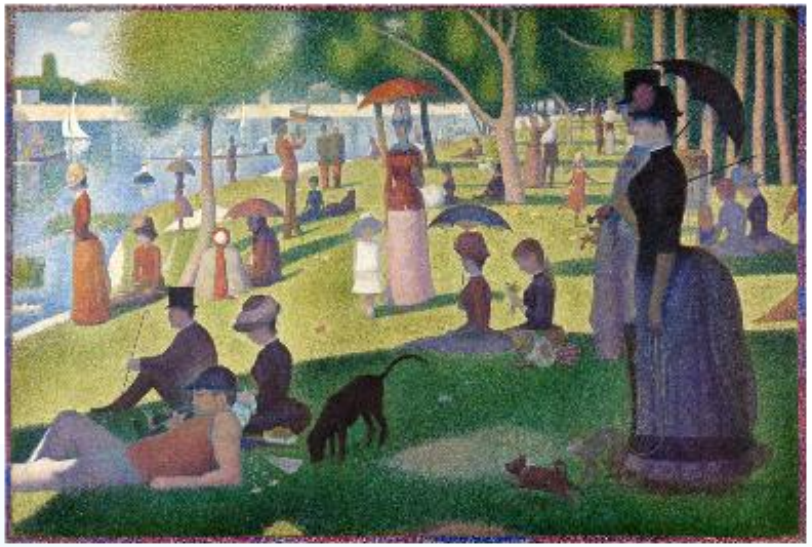
There are dumbbells in there alright, but it seems no picture of a dumbbell is complete without a muscular weightlifter there to lift them.

Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015



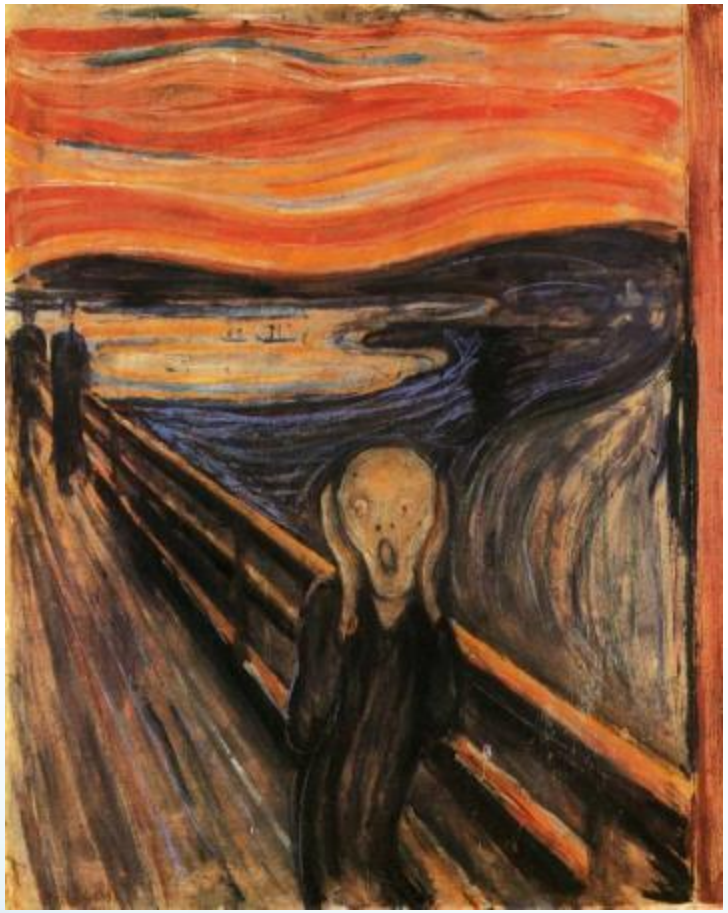
Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

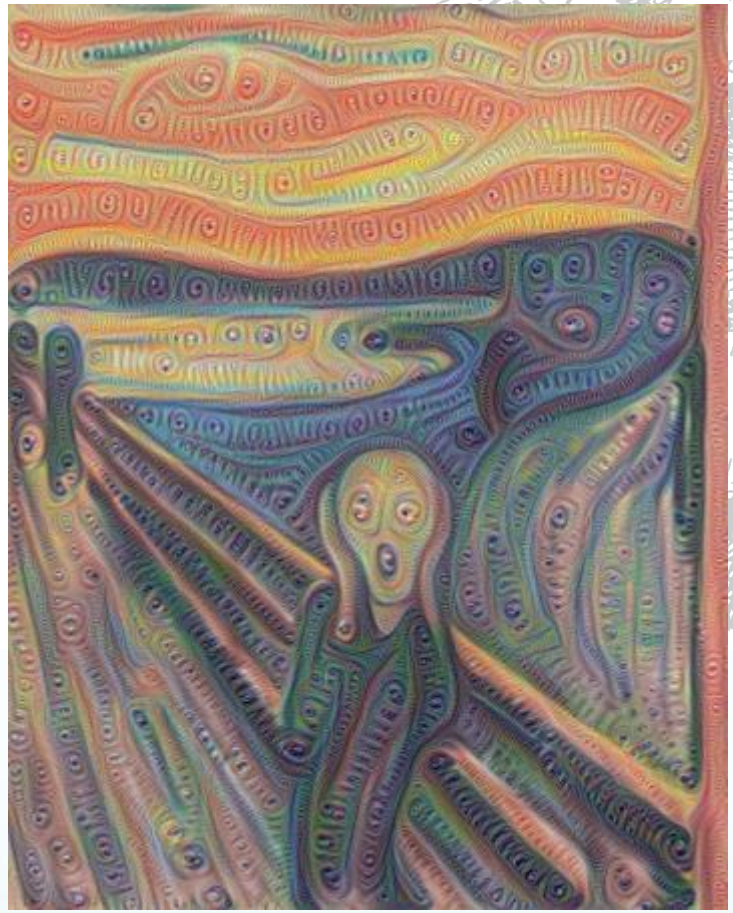
Left: Original photo by Zachi Evenor. Right: Right: Michael Tyka and *Günther Noack*



Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

Left: Original photo by Zachi Evenor; Right: processed by Günther Noack, Software Engineer





Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

Left: The Scream, 1893 by Edvard Munch; Right: Michael Tyka

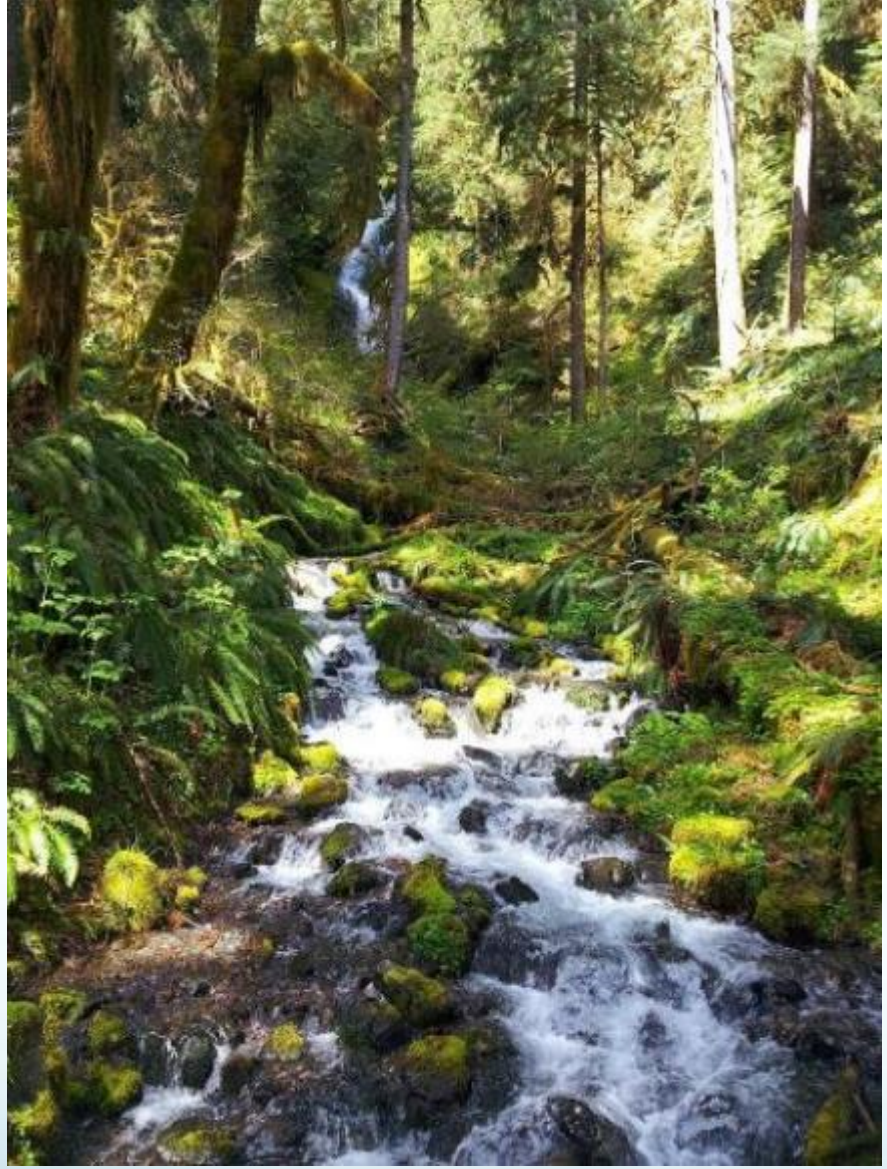
Google Research Blog

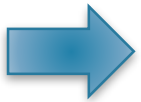
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

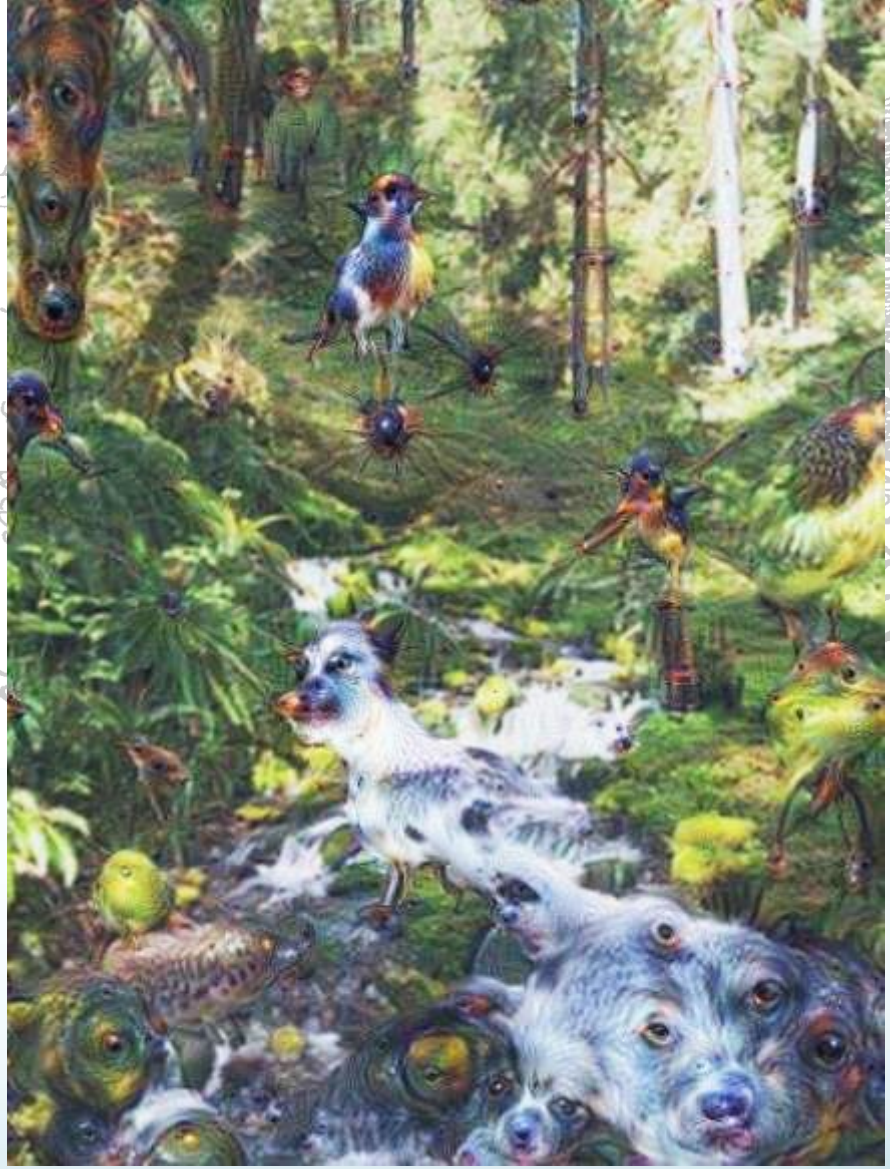
Right: Michael Tyka

Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

Right: Michael Tyka







Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

Google Research Blog
Inceptionism: Going Deeper into Neural Networks, June 17, 2015

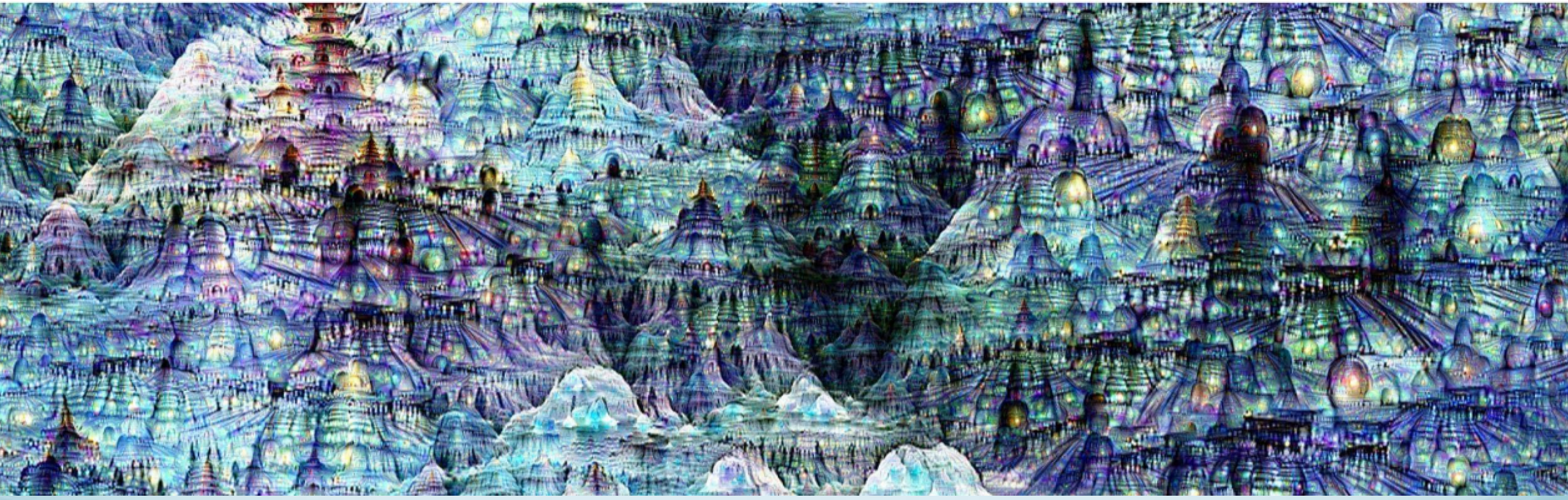
Neural net “dreams”— generated purely from random noise, using a network trained on places by MIT Computer Science and AI Laboratory. See our Inceptionism gallery for hi-res versions of the images above and more (Images marked “Places205-GoogLeNet” were made using this network)

DeepDream: The art of neural networks

Feb 26 - 6:00 PM

Gray Area

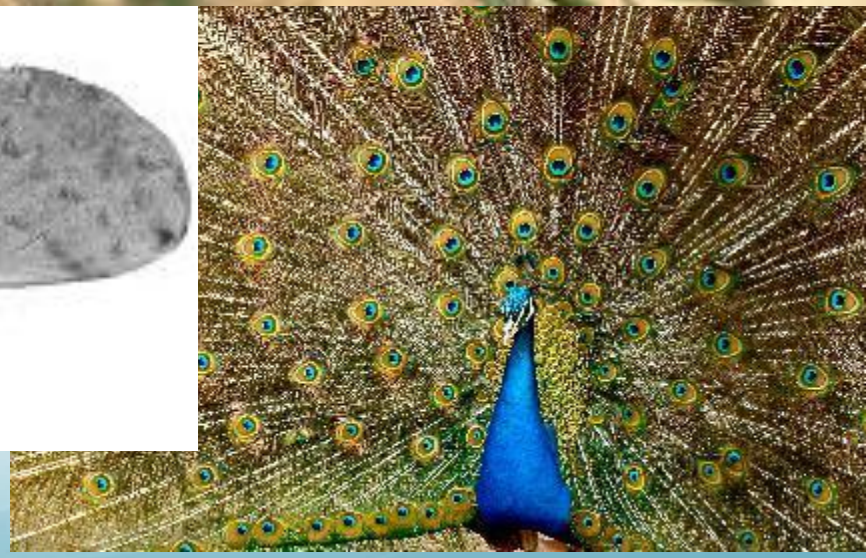
Get Tickets



Do CNNs give us insights to human vision?

- Analogies to Biological Vision?
  - Pros: Primate Vision – 30 layers
  - Cons: Perceived objects exist in space, time, and causal framework with respect to perceiver.
- Vision evolving 500+ million years: Innate Abilities?
  - Newborn chicks see hawk's shadow
  - Baby recognizes smile

The Eyes Have It !!



Zero Trial Learning?

Invitation to Continue this Inquiry

- Deep dive into techniques and tools
  - Deep Dream via Caffe and TensorFlow
  - Clarifai Developer Tools
- Ongoing
  - Define a program of inquiry
  - Invite additional experts in various disciplines
  - Develop an on-line forum
  - Ongoing series of events (in conjunction with meetups like Brains ‘n Bots, NYC Deep Learning, Etc.)