

CS 6501 – Large-scale Data-driven Graphics and Vision

Fall 2015

Connelly Barnes

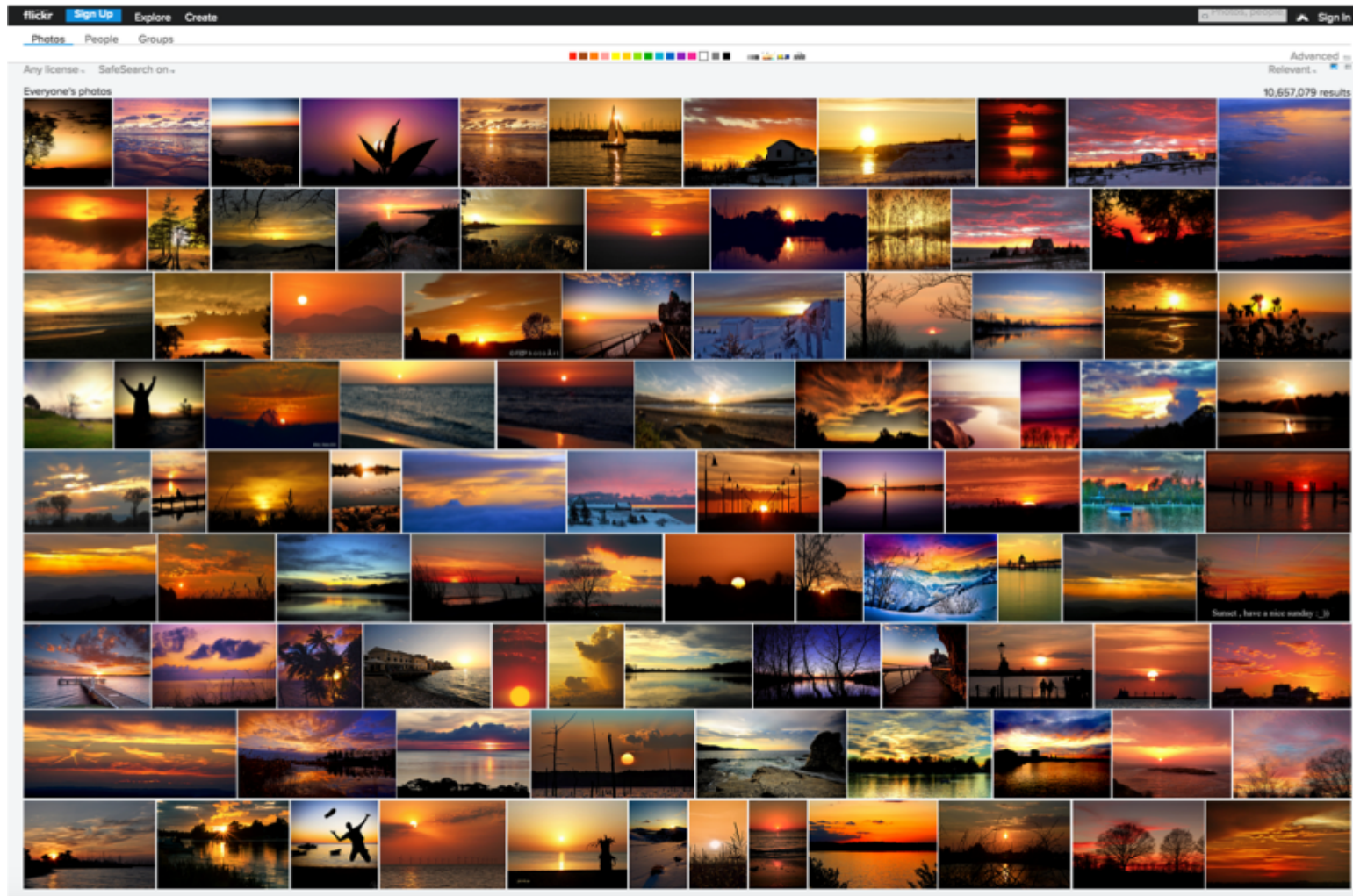
Big Visual Data

- Billions of photos: Google street view



Big Visual Data

- Billions of photos: Flickr




Big Visual Data

- Billions of photos: Facebook




Big Visual Data


- Billions of videos: YouTube
- 25 million cat videos



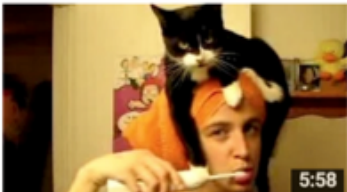
Funny Cats Compilation [Most See] Funny Cat Videos Ever Part 1
by Forget Your Sadness
1 year ago • 54,660,672 views
My current Youtube Network: <http://pixellabnetwork.com/en/creators/> Feel free to apply for a Youtube Partnership. Check out other ...
14:02 HD



Ultimate cat vines compilation - Funny cats compilation
by OkiDokiVines
2 months ago • 6,704,907 views
Ultimate cat vines compilation - Funny cats compilation In this video, I show popular Vine videos featuring cats. This is the longest ...
14:58 HD



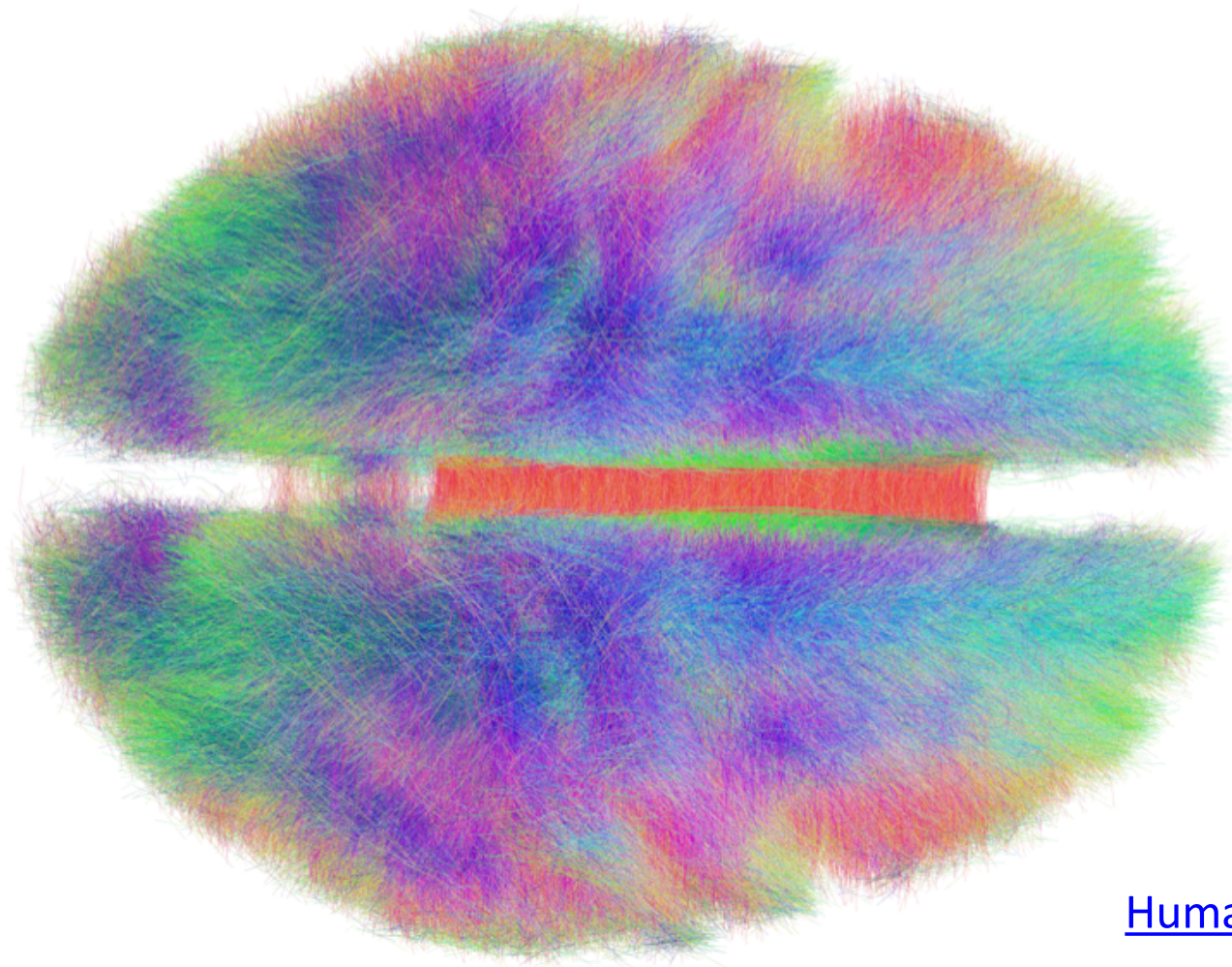
Funny cats and babies playing together - Cute cat & baby compilation
by Tiger Productions
8 months ago • 46,012,220 views
Cats can be very ignorant and mean but these cats are something special. Just look how all this kitties like to play with babies.
7:53 HD



Funny cats annoying owners - Cute cat compilation
by Tiger Productions
9 months ago • 5,133,601 views
Cats are funny and cute but sometimes they can be a real pain in the neck :P Soo annoying and destructive! They break lamps ...
5:58 HD

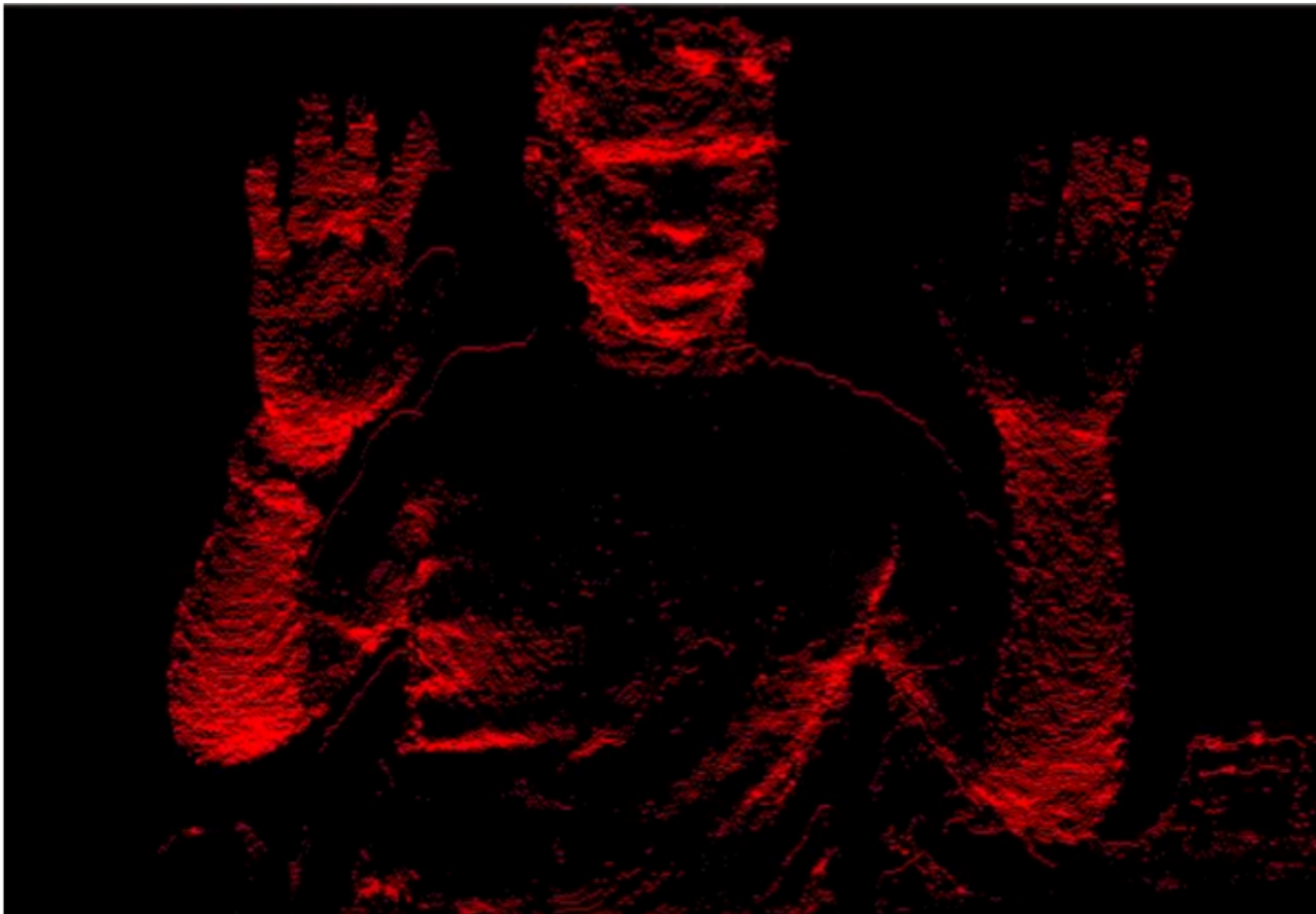
Big Visual Data

- Medical imaging: photos or volumetric data



Big Visual Data

- New sensors: depth (Kinect), stereo cameras



[Kinect depth video](#)

Big Visual Data

- New displays: VR headsets (Oculus Rift, Microsoft Hololens)



[Microsoft
Hololens
video](#)

Big Visual Data

- Autonomous devices: cars, quadcopters



[DJI Phantom 3 video](#)

Problems

- How do we gain insights from the visual data?
- How do we process all the data efficiently?
 - Real time processing?
 - Minimize network bandwidth?
- Computer graphics: model with precision, display, edit, visualize
- Computer vision: model probabilistically, infer meaning, categories, find correspondences

Topics

- Computer vision and imaging basics
- Deep learning for X
 - Segmentation, classification, facial recognition, feature extraction, visualization
- Photo collections
 - Finding correspondences, enhancement, editing, visualization
- Images with Depth

Topics

- Going 3D
 - Structure from motion, city reconstruction, scene-space processing
- Cars
 - Road, trajectory estimation, object detection, DARPA challenges
- TBD. Medical imaging? Connectomics?

Course Website

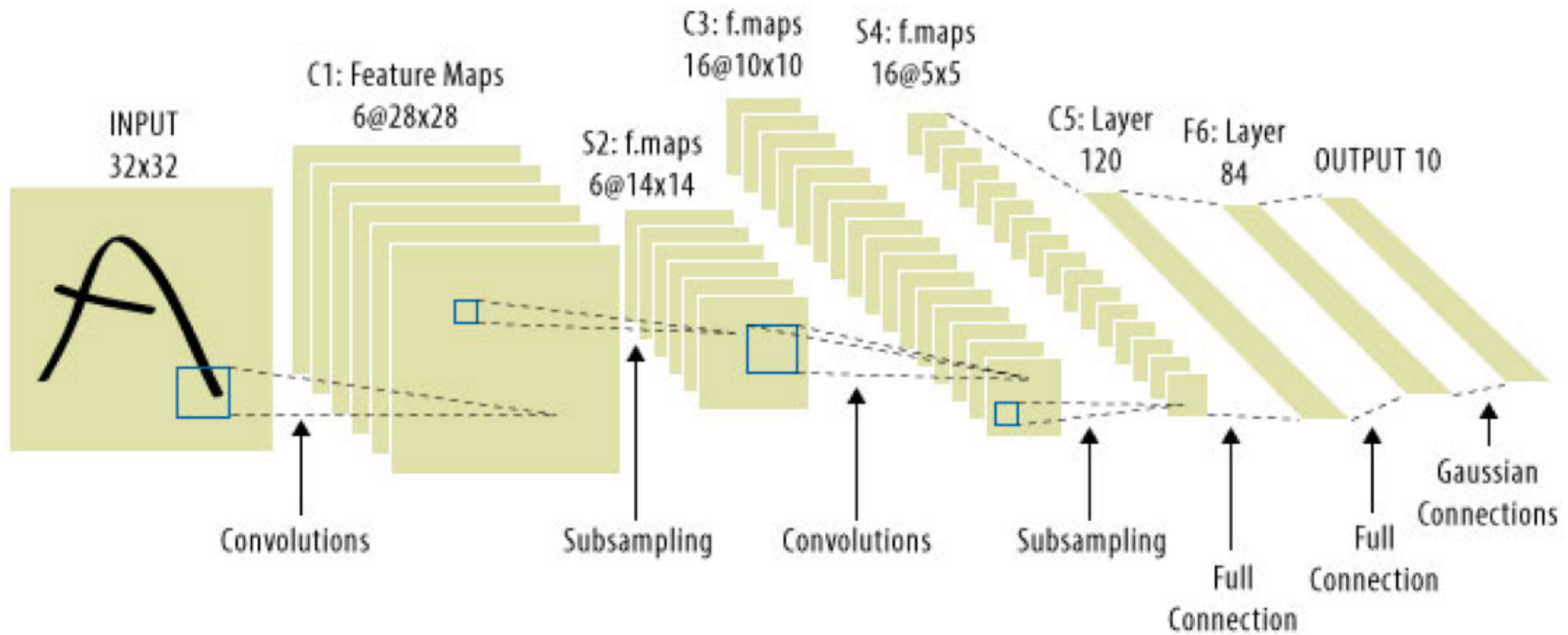
- http://www.connellybarnes.com/work/class/2015/large_scale/
- Other ways to find the website:
 - Linked to from [UVa Collab](#)
 - Linked to from [Lou's list](#)
 - Linked to from my website [connellybarnes.com](http://www.connellybarnes.com)

Grading

- Quizzes in class (15%)
- Student paper presentations (20%)
 - Sign up for two presentations here:
<http://tinyurl.com/otjeqv2>
- Programming assignments (35%)
- Final course project (30%)

Sampling of Course Topics

- Convolutional Neural Networks



Sampling of Course Topics

- Google Deep Dream



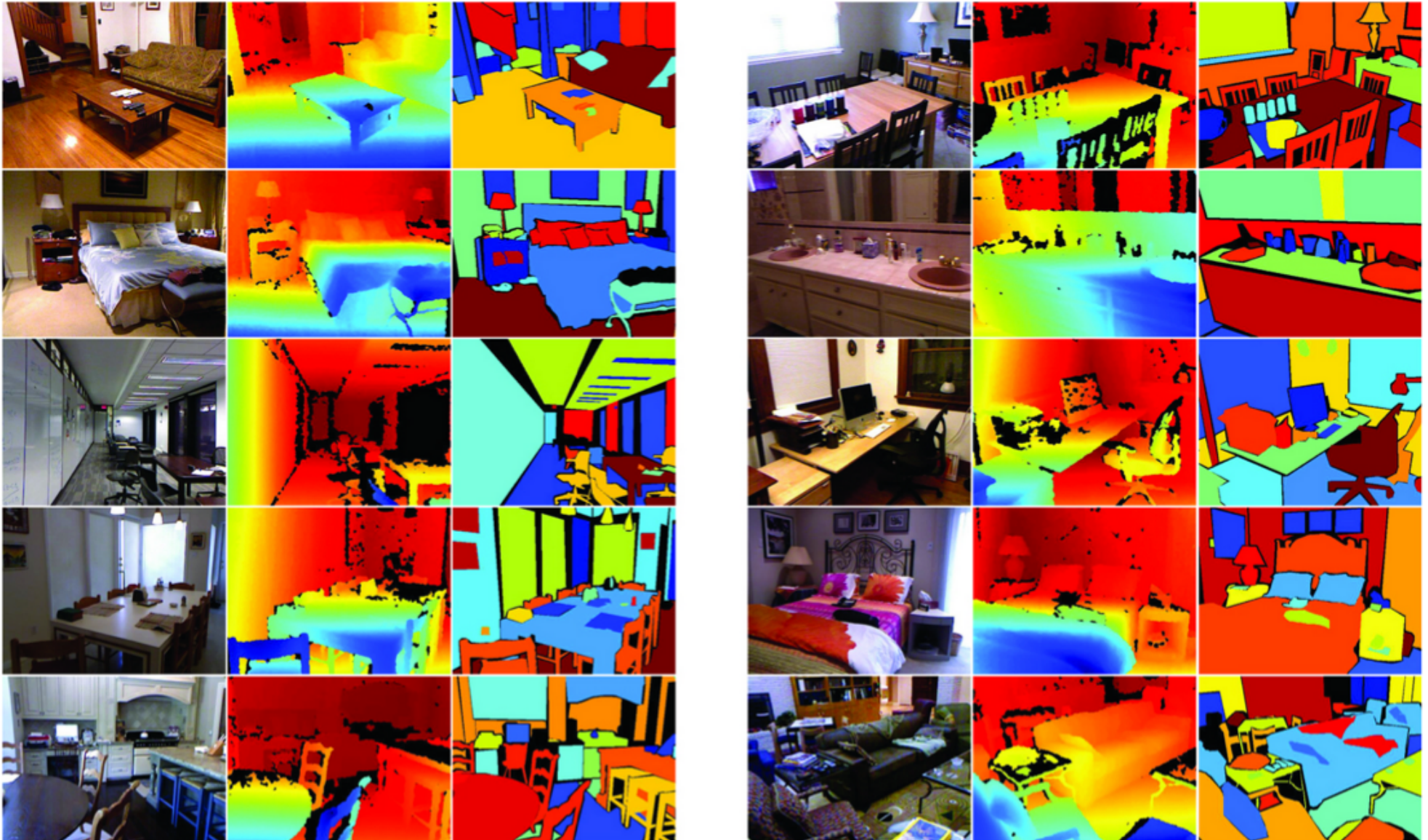
<http://googleresearch.blogspot.com/2015/06/inceptionism-going-deeper-into-neural.html>







RGBD (depth) datasets



[\[NYU Depth Dataset\]](#)

Photo Collection Editing



more "autumn"



more "warm"



more "rain"



more "winter"



more "moist"



more "night"

[\[Transient attributes paper\]](#)

Scene-Space Video

- https://www.youtube.com/watch?v=AAn_yKEFRj0

Building Rome in a Day

- <http://grail.cs.washington.edu/rome/>

Cars

- <http://www.robot.cc/papers/dahlkamp.adaptvision06.pdf>

