computational social media

lecture 4: shooting
part 2

daniel gatica-perez

12.04.2019
this lecture

1. a snapshot of the present
   flickr, instagram, snapchat

2. a look into the past
   20th century image sharing practices

3. understanding research on social image systems
   flickr: tags & communities
   computer vision as an enabler
   instagram: selfies & engagement
   snapchat: ephemeral social media
announcements (1)

- assignment #3 will be given today (see separate slides)
- no class on 19.04 and 26.04 (EPFL calendar)
- next class on 03.05: project progress reporting
- need to reschedule last class & final project presentation day
- reading #5 will be presented today
  G. Reece and C. M. Danforth
  Instagram photos reveal predictive markers of depression
  EPJ Data Science, 2017
  Presenter: A. Sunjerga
  Discussant: V. Bernasconi
  Scribe: R. Petitpierre
announcements (2):
project progress reporting day on 03.05.2019

project progress presentation
  10-minute presentation with slides
  goals
  any changes w.r.t. first presentation
  what you have done so far
  what remains to be done
announcements (3):
new dates for last class & final presentation day

last class (originally scheduled on Fri 31.05)
new date: Mon 27.05 or Tue 28.05
new time: 10:00-13:00 or 13:00-16:00 or 15:00-18:00
room to be confirmed (by email)

final project presentation day (originally scheduled on Fri 07.06)
new date: Tue 11.06 or Wed 12.06
new time: 09:00-12:00
room to be confirmed (by email)
tags, communities, geo-tagged media

selfies & followers

ephemeral social media
computer vision as an enabler
ResNet’s object detection result on COCO

*the original image is from the COCO dataset


Kaiming He, ICML 2016 tutorial:
A person riding a motorcycle on a dirt road.

Two dogs play in the grass.

A group of young people playing a game of frisbee.

Two hockey players are fighting over the puck.

A herd of elephants walking across a dry grass field.

A close up of a cat laying on a couch.

Show and tell: A neural image caption generator, O Vinyals, A Toshev, S Bengio, D Erhan, CVPR 2015
supervised learning: raw data + labels

Source:
Figure 3. Example network architectures for ImageNet. **Left:** the VGG-19 model [40] (19.6 billion FLOPs) as a reference. **Middle:** a plain network with 34 parameter layers (3.6 billion FLOPs). **Right:** a residual network with 34 parameter layers (3.6 billion FLOPs). The dotted shortcuts increase dimensions. **Table 1** shows more details and other variants.

visual classification with deep learning

what labels should computers recognize?
who decides?
before: images & object labels

Corel Gallery (1st ed. 1994)

airplanes, black bears, brown bears, cheetahs, eagles, elephants, horses, polar bears, tigers, zebras.

today: 1000 object categories

ImageNet is an image database organized according to the WordNet hierarchy (currently only the nouns), in which each node of the hierarchy is depicted by hundreds and thousands of images. Currently we have an average of over five hundred images per node. We hope ImageNet will become a useful resource for researchers, educators, students and all of you who share our passion for pictures. Click here to learn more about ImageNet, Click here to join the ImageNet mailing list.

http://www.image-net.org/
By MIT Computer Science and Artificial Intelligence Laboratory

Scene recognition is one of the hallmark tasks of computer vision, allowing defining a context for object recognition. Here we introduce a new scene-centric database called Places, with 205 scene categories and 2.5 millions of images with a category label. Using convolutional neural network (CNN), we learn deep scene features for scene recognition tasks, and establish new state-of-the-art performances on scene-centric benchmarks. Here we provide the Places Database and the trained CNNs for academic research and education purposes.

Announcement

- **NEW** Places2, the 3rd generation of the Places Database, is available for use, with more images and scene categories. CNNs trained on Places365 (new Places2 data) are also released.
- Scene Parsing Challenge 2016 and Places Challenge 2016 are hosted at ECCV'16.
- Places205-VGG and Places205-GoogLeNet are available to download in the Places CNNs.

http://places.csail.mit.edu/
before: images & human labels

Figure 7: Output of our face detector on a number of test images from the MIT+CMU test set.

P Viola, M Jones, Rapid object detection using a boosted cascade of simple features, in Proc. CVPR 2001
today: biometrics as a service

https://www.faceplusplus.com/attributes/
who tags the images?
Welcome to LabelMe, the open annotation tool.

The goal of LabelMe is to provide an online annotation tool to build image databases for computer vision research. You can contribute to the database by visiting the annotation tool.

Log In

Username  
Password  
Forgot your password?

Login

or Sign Up  Why?

Name

http://labelme.csail.mit.edu/Release3.0/
Make Money by working on HITs

HITs - Human Intelligence Tasks - are individual tasks that you work on. Find HITs now.

As a Mechanical Turk Worker you:
- Can work from home
- Choose your own work hours
- Get paid for doing good work

Find an interesting task
Work
Earn money

or learn more about being a Worker

Get Results from Mechanical Turk Workers

Ask workers to complete HITs - Human Intelligence Tasks - and get results using Mechanical Turk. Register Now

As a Mechanical Turk Requester you:
- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you’re satisfied with the results

Fund your account
Load your tasks
Get results

249,109 HITs available. View them now.
Restaurant Les Remparts

Feel #happy in 
#Gruyere. Have lunch with #cheese, #rosti at #fancy restaurant with #friends
instagram
what was Instagram at the beginning?

mobile app with image filters
vintage-looking images
social connectivity
- followers
- by default, images were public
- privacy settings to control access

interaction
- users check their stream
- likes
- comments
- hashtags
what do people share on instagram?
selfie (n.)

“a photograph that one has taken of oneself, typically one taken with a smartphone or webcam and uploaded to a social media website”

usage: “occasional selfies are acceptable, but posting a new picture of yourself every day isn’t necessary"

credit: Roberto Schmidt/AFP/Getty Images  
http://www.oxforddictionaries.com/definition/english/selfie
visual categories

1000 photos = 50 random active users (>30 followees, >30 followers, >60 photos); 20 latest photos per user

Random 200-photo sample:
+ extract visual features (SIFT)
+ get 15 clusters (k-means)
+ manually refine clusters
+ 8 final categories

Remaining 800 photos
+ map to closest category
+ single category per photo

<table>
<thead>
<tr>
<th>Category</th>
<th>Exemplary Photos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends (users posing with others friends; At least two human faces are in the photo)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Food (food, recipes, cakes, drinks, etc.)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Gadget (electronic goods, tools, motorbikes, cars, etc.)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Captioned Photo (pictures with embed text, memes, and so on)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Pet (animals like cats and dogs which are the main objects in the picture)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Activity (both outdoor &amp; indoor activities, places where activities happen, e.g., concert, landmarks)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Selfie (self-portraits; only one human face is present in the photo)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
<tr>
<td>Fashion (shoes, costumes, makeup, personal belongings, etc.)</td>
<td><img src="image" alt="Exemplary Photos" /></td>
</tr>
</tbody>
</table>

Table 1: 8 Photo Categories

Y. Hu, L. Manikonda, S. Kambhampati, What We Instagram: A First Analysis of Instagram Photo Content and User Types, in Proc. AAAI ICWSM 2014
Figure 2: Proportion of Categories
large-scale selfie analysis
Figure 3: Example pictures of Selfie, Alt, and Face datasets as well as features predicted by Face++.

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Description</th>
<th># Pictures</th>
<th># Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selfie</td>
<td>Pictures with hashtags containing ‘selfie’ (e.g., #selfie, #selfietoday)</td>
<td>1,196,080</td>
<td>214,656</td>
</tr>
<tr>
<td>Alt</td>
<td>Pictures with alternative hashtags for ‘selfie’ (e.g., #selca, #selstagram)</td>
<td>2,453,749</td>
<td>242,650</td>
</tr>
<tr>
<td>Face</td>
<td>Pictures with face(s) detected using the Face++ tool</td>
<td>1,921,207</td>
<td>315,751</td>
</tr>
<tr>
<td>All</td>
<td>Randomly chosen set of pictures</td>
<td>10,000,019</td>
<td>184,615</td>
</tr>
</tbody>
</table>

Table 1: Number of media and users in each of the four datasets used in this paper.
Figure 4: Longitudinal trend of selfie posts across the datasets.
faces get more likes on instagram
two questions:
- do photos with & without faces differ w.r.t. engagement (likes & comments)?
- do features of the subject (gender, age) affect engagement?

Accuracy (w.r.t. majority vote):
- has face: 97%
- has female face: 96%
- has male face: 96%
- has face < 18 yo: 93%
- has face in (18, 35) yo: 96%
- has face > 35 yo: 99%

Image: number of Likes
Image: number of Comments
User: number of followers
User: number of photos
Figure 1. Example Face++ face detection and how we construct our variables. The photo used in this example is a photo under Creative Commons license from Flickr.
<table>
<thead>
<tr>
<th>Type</th>
<th>Variable</th>
<th>Description</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement</td>
<td>likes*</td>
<td>Number of likes on each photo.</td>
<td></td>
</tr>
<tr>
<td>(dependent)</td>
<td>comments*</td>
<td>Number of comments on each photo.</td>
<td></td>
</tr>
<tr>
<td>Audience</td>
<td>followers*</td>
<td>Number of users who follow the photo’s owner.</td>
<td></td>
</tr>
<tr>
<td>&amp; Activity</td>
<td>photos*</td>
<td>Number of photos shared by photo’s owner.</td>
<td></td>
</tr>
<tr>
<td>(predictor)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Distributions of quantitative and binary variables used in this paper. Variables marked with *[ ]* are log-transformed. The red and blue lines identify mean and median of the distribution, respectively. Orange refers to 1’s in the bar graphs. The engagement variables are our dependent measures. Audience and activity variables are used as controls, and faces variables are the focal point of this study.
Table 1. Distributions of quantitative and binary variables used in this paper. Variables marked with "***" are log-transformed. The red and blue lines identify mean and median of the distribution, respectively. Orange refers to 1’s in the bar graphs. The engagement variables are our dependent measures. Audience and activity variables are used as controls, and faces variables are the focal point of this study.
data analysis model

- face binary features (6)
- # followers
- # photos
- # likes
- # comments

log () → z-score normalization

negative binomial regression parameters (beta, p-values)

model when dependent variable is count data and over-dispersed (observed variance is higher than the variance of theoretical model)
“the higher the number of followers, the more likely it is for a photo of that user to receive likes and comments” [larger audience for a given photo]

“the higher activity (number of photos), the lower chances of receiving likes and comments” [less “exposure” time for any given photo]

“the number of likes and comments are significantly higher when there is at least one face in the image” [photos with faces engage people more]
visualizing instagram: selfiecity

SELFIECITY

Investigating the style of self-portraits (selfies) in five cities across the world.

Selfiecity investigates selfies using a mix of theoretic, artistic and quantitative methods:

We present our findings about the demographics of people taking selfies, their poses and expressions.

Rich media visualizations (imageplots) assemble thousands of photos to reveal interesting patterns.

The interactive selfexploratory allows you to navigate the whole set of 3200 photos.

Finally, theoretical essays discuss selfies in the history of photography, the functions of images in social media, and methods and dataset.

selfiecity.net (L. Manovich et al., 2014)
inferring real-world events from instagram data
+ ML + CV+ NLP to understand:

Obesity rates [1]
Food & drink patterns [2]
Food perception [3,4]
Depression [5]
etc. etc.

[2] T. Phan and D. Gatica-Perez, #Healthy #Fondue #Dinner: Analysis and Inference of Food and Drink Consumption Patterns on Instagram, in Proc. Int. Conf. on Mobile and Ubiquitous Multimedia 2017
instagram images & hashtags for deep learning
hashtags as weak labels: noisy, but abundant and for free
one billion instagram images
for weakly supervised pretraining

<table>
<thead>
<tr>
<th>Name template</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>train-IG-I-1.5k</td>
<td>Instagram training set of I images and $\sim$1.5k hashtags from ImageNet-1k.</td>
</tr>
<tr>
<td>train-IG-I-8.5k</td>
<td>Instagram training set of I images and $\sim$8.5k hashtags from WordNet.</td>
</tr>
<tr>
<td>train-IG-I-17k</td>
<td>Instagram training set of I images and $\sim$17k hashtags from WordNet.</td>
</tr>
<tr>
<td>train-IN-1M-1k</td>
<td>The standard ImageNet-1k ILSVRC training set with 1.28M images.</td>
</tr>
<tr>
<td>val-IN-50k-1k</td>
<td>The standard ImageNet-1k ILSVRC validation set with 50k images.</td>
</tr>
<tr>
<td>train-IN-I-L</td>
<td>Extended ImageNet training set of I images and $L \in {5k, 9k}$ labels.</td>
</tr>
<tr>
<td>val-IN-I-L</td>
<td>Extended ImageNet validation set of I images and $L \in {5k, 9k}$ labels.</td>
</tr>
<tr>
<td>train-Places-1.8M-365</td>
<td>The Places365-Standard training set (high-resolution version).</td>
</tr>
<tr>
<td>train-COCO-115k-80</td>
<td>The standard COCO detection training set (2017 version).</td>
</tr>
<tr>
<td>val-COCO-5k-80</td>
<td>The standard COCO detection validation set (2017 version).</td>
</tr>
<tr>
<td>test-COCO-20k-80</td>
<td>The standard COCO detection test-dev set (2017 version).</td>
</tr>
</tbody>
</table>

Table 1: Summary of image classification datasets. Each dataset is named with a template, \textit{role-source-I-L}, that indicates its role (training, validation, testing), source, number of images I, and number of labels L.
results

Fig. 1: Classification accuracy of ResNeXt-101 32×16d pretrained on IG-1B with different hashtag vocabularies (purple bars) on IN-{1k, 5k, 9k} (left) and CUB2011, Places365 (right). Baseline models (gray bars) are trained on IN-{1k, 5k, 9k} (left) and IN-1k (right), respectively. Full network finetuning is used. Higher is better.

D. Mahajan, R. Girshick, V. Ramanathan, K. He, M. Paluri, Y. Li, A. Bharambe, L. van der Maaten, Exploring the Limits of Weakly Supervised Pretraining, in Proc ECCV 2018.
tags, communities, geo-tagged media

selfies & followers

ephemeral social media
ephemeral image sharing
affordances

“possible actions a person can perform on an object” (Don Norman)

credit: http://www.flickr.com/photos/pocait/2634190989 (cc)
four affordances of social media

“persistence:
the durability of online expressions & content

visibility:
the potential audience who can bear witness

spreadability:
the ease with which content can be shared

searchability:
the ability to find content”

persistence

it enables asynchronous interaction

conversations endure; messages don’t expire

posts are “on the record” forever

the opposite of ephemeral


image (cc): http://upload.wikimedia.org/wikipedia/commons/3/35/Broken_clock.png
What is 4chan?

4chan is a simple image-based bulletin board where anyone can post comments and share images. There are boards dedicated to a variety of topics, from Japanese animation and culture to videogames, music, and photography. Users do not need to register an account before participating in the community. Feel free to click on a board that interests you and jump right in!

Be sure to familiarize yourself with the rules before posting, and read the FAQ if you wish to learn more.

Boards

Japanese Culture
Anime & Manga
Anime/Cute
Anime/Wallpapers
Mecha
Cosplay & EGL
Cute/Male
Flash
Transportation
Otaku Culture
Pokémon

Interests

Video Games
Video Game Generals
Retro Games
Comics & Cartoons
Technology
Television & Film
Weapons
Auto
Animals & Nature
Traditional Games
Sports
Alternative Sports
Science & Math
International
Outdoors
Toys
Business & Finance

Creative

Oekaki
Papercraft & Origami
Photography
Food & Cooking
Artwork/Critique
Wallpapers/General
Music
Fashion
3DCG
Graphic Design
Do-It-Yourself
Worksafe GIF

Adult (NSFW)

Sexy Beautiful Women
Hardcore
Handsome Men
Hentai
Ecchi
Yuri
Hentai/Alternative
Yaoi
Torrents
High Resolution
Adult GIF

Other

Travel
Fitness
Paranormal
Literature
Advice
LGBT
Pony
Misc. (NSFW)
Random
Request
ROBOT9001
Politically Incorrect
Cams & Meetups
Shit 4chan Says

Recent Images

Animals & Nature: could be some sort of replica
Anime/Wallpapers: B is for Bakemonogatari
Graphic Design: thanks mate ;)
Fashion: is she fat or something
Travel: continued
Anime/Cute: No 2220539 by Anonymous
Otaku Culture: I had too much chili concarne last...
Fitness: My week 1 month of SL never having...
Anime/Cute: New chapter when?
Paranormal: I lead to
content is shared anonymously

“ephemerality is enforced by thread expiration and a large volume of incoming content

threads begin on page one and are pushed down as new threads are added

if a user replies to a thread, it is bumped back to the top of the first page

if the thread reaches the bottom of the fifteenth page, the thread is removed permanently and its URL returns a ‘Page Not Found’ error

this process can take place over minutes”

“The disappearance of images may (or may not) afford a new kind of privacy

Adults fret about how teens use this affordance to share inappropriate pictures, projecting their own bad habits onto youth

What makes Snapchat matter has to do with how it treats attention”
“When someone sends an image via Snapchat, they choose how long you get to view the image/video. **The underlying message is simple: You’ve got 7 seconds. PAY ATTENTION.**

Snapchat asks you to …pay attention to the gift that someone in your network just gave you.

Teens choose not to open a Snap the moment they get it because they want to wait for the moment when they can appreciate whatever is behind that closed door.

And when they do, they tune out everything else and just concentrate on what’s in front of them.

Snapchat simply notifies the creator when the receiver opens it up.

Snapchat invites focus … it is a reminder that … the ephemeral is valuable.

There aren’t many services that fundamentally question the default logic of social media”

[Instagram Stories copied the model (image disappearance after 24 hours) in Aug. 2016]
what to remember

Social images as community activity
Tags and communities as key features

Social images as expression of the self
Computer vision enabling detailed analyses
Higher attention when faces are present

Social images as ephemeral activity
Attention can be focused through ephemerality
questions?

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