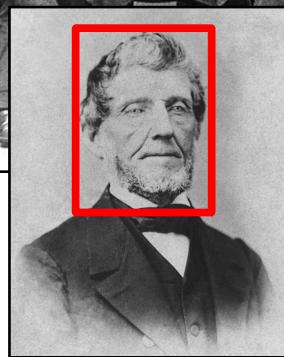
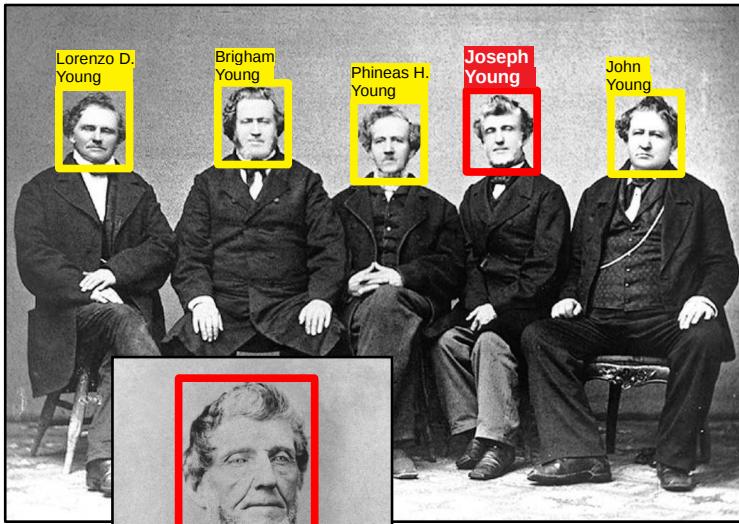
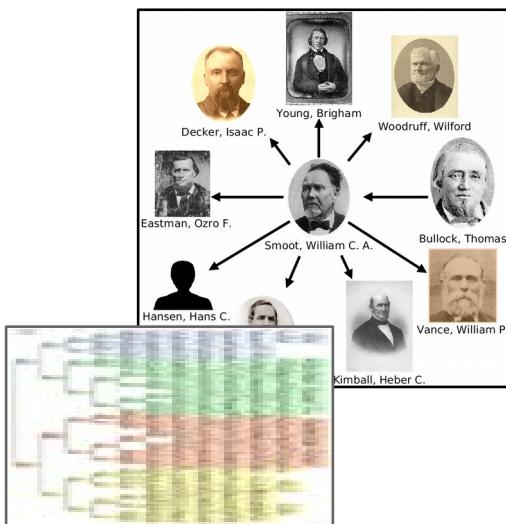


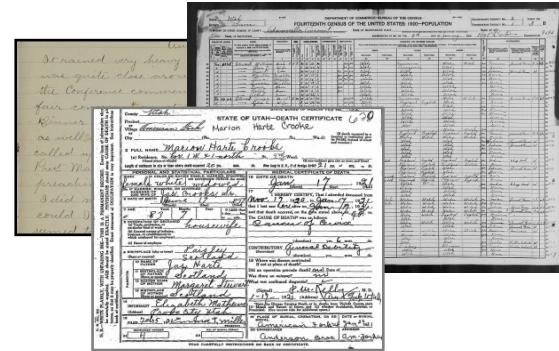
Faces, Places and Kin: Applying Computer Vision to Family History



Databases



Genealogies, Links,
Historical Social Networks

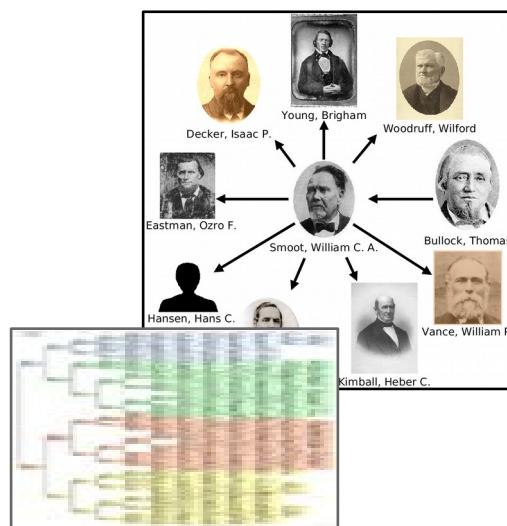


Records and
Documents



Images, Media
(People, Places, Events)

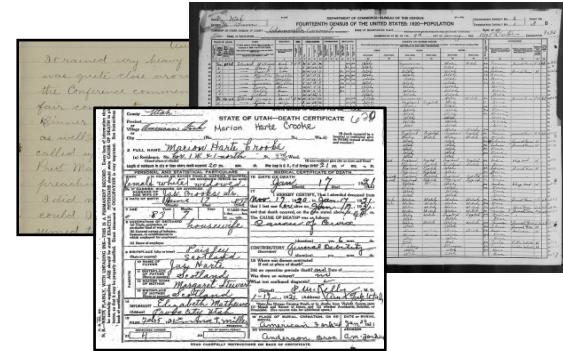
Databases



Genealogies, Links,
Historical Social Networks



Images from Documents
(Books, News, Obituaries,
yearbooks, Histories, etc.)



Records and
Documents



Images, Media
(People, Places, Events)



Video

Who? When? Where?



- Context (captions, labels, titles, text)
- Metadata (image or collection-level)
- Tags



Computer Vision, Machine Learning

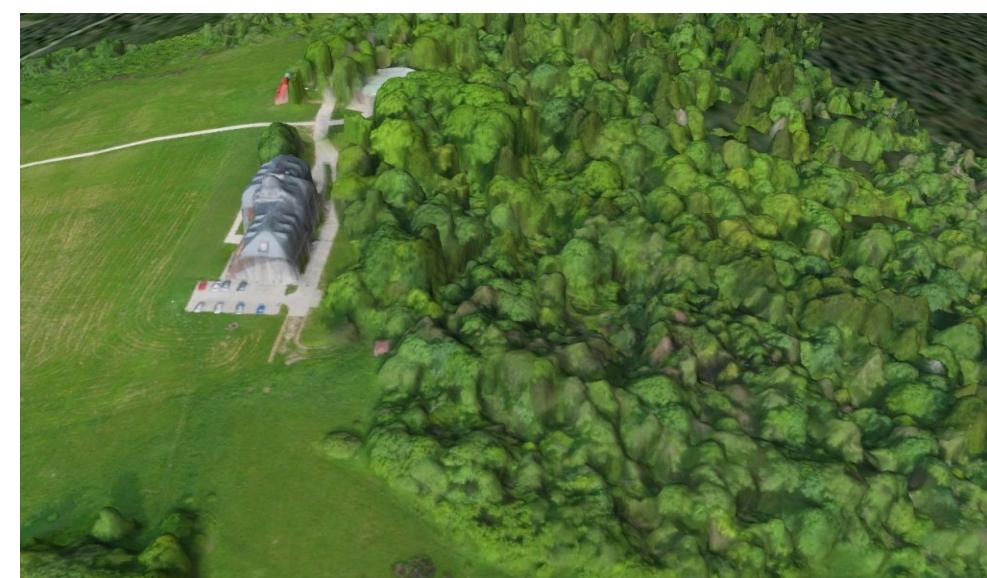
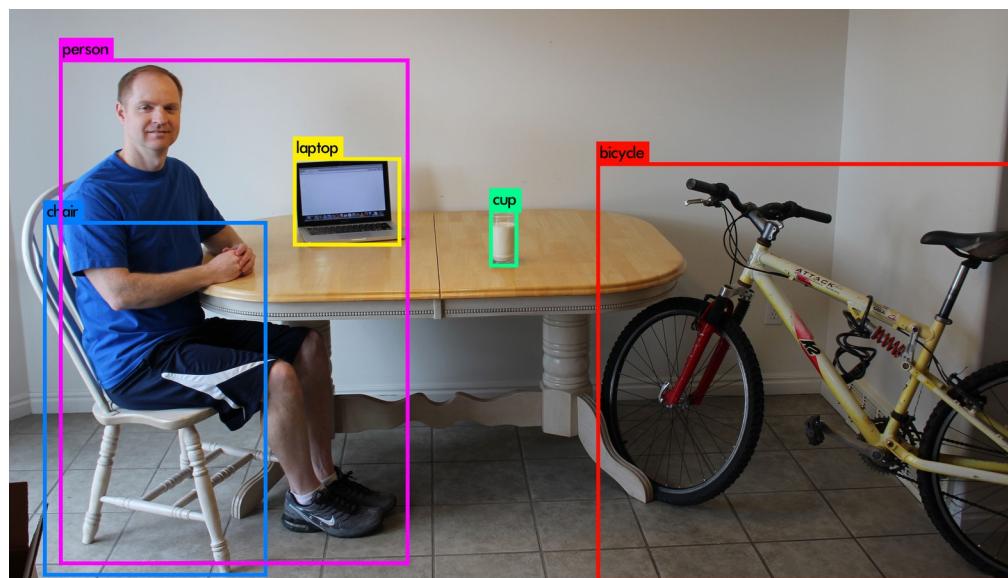
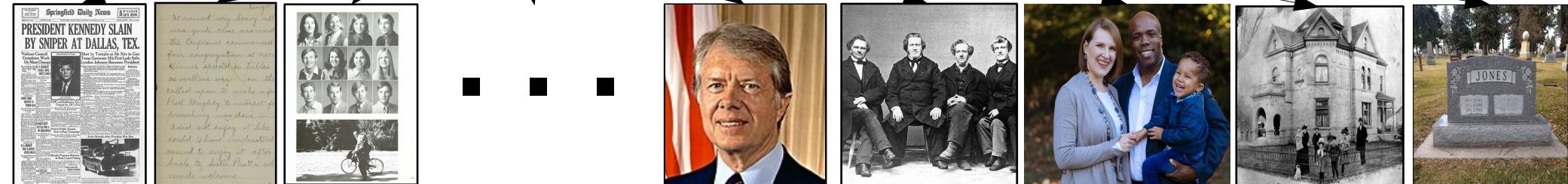


Image Classification, Object Recognition



What?



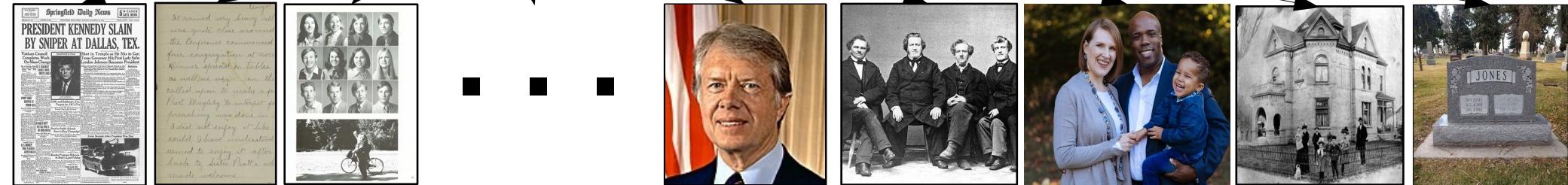
News Letter YearBk

Individual People+
indoors People+
outside House+
People Headstone
People

Image Classification, Object Recognition



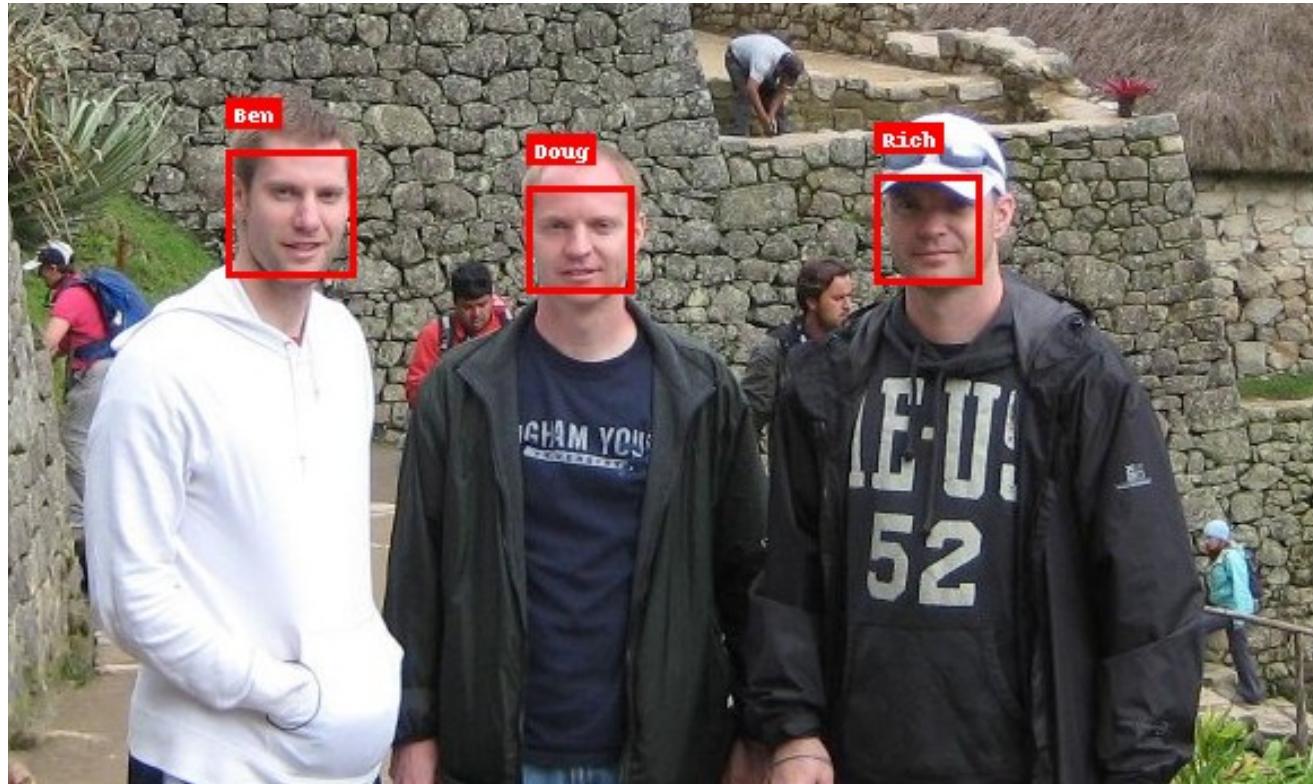
What?



News	Letter	YearBk	Individual	People+ indoors	People+ outside	People+ House	Headstone
Layout	HR	Layout	Face	Faces	Faces	Faces	Locate text
OCR	NLP	Faces	Age	Ages	Ages	Ages	OCR
Articles	Entities	OCR	HSN	HSNs	HSNs	HSNs	Metadata
NLP	HSNs	Names	Links	Links	Links	House #	Cem Record
Entities	Links	HSNs				Street	Tree
Images		Links				Location	HSNs
Links						Links	Links

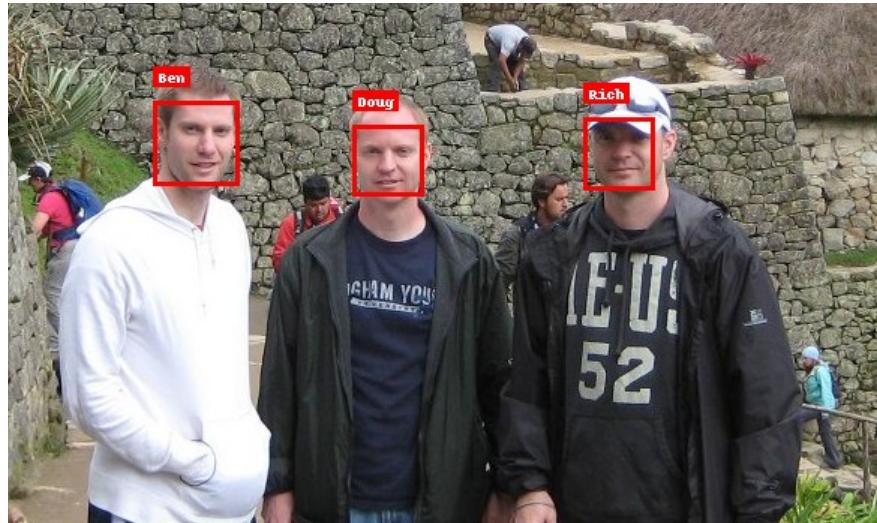
How?

Face Recognition



Who?

Face Analysis (age, gender, etc.)

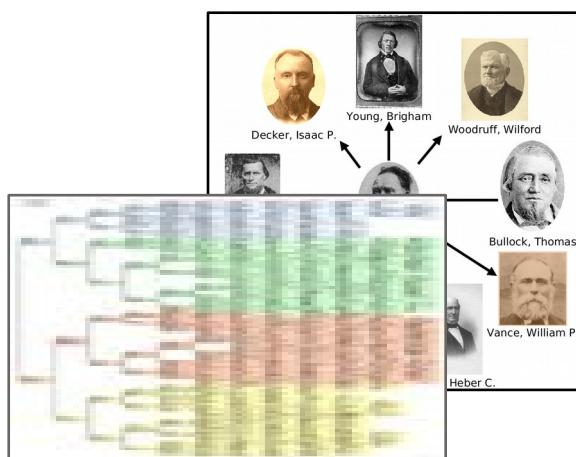
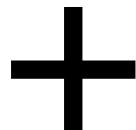


When?

2007-2021

1993-2007

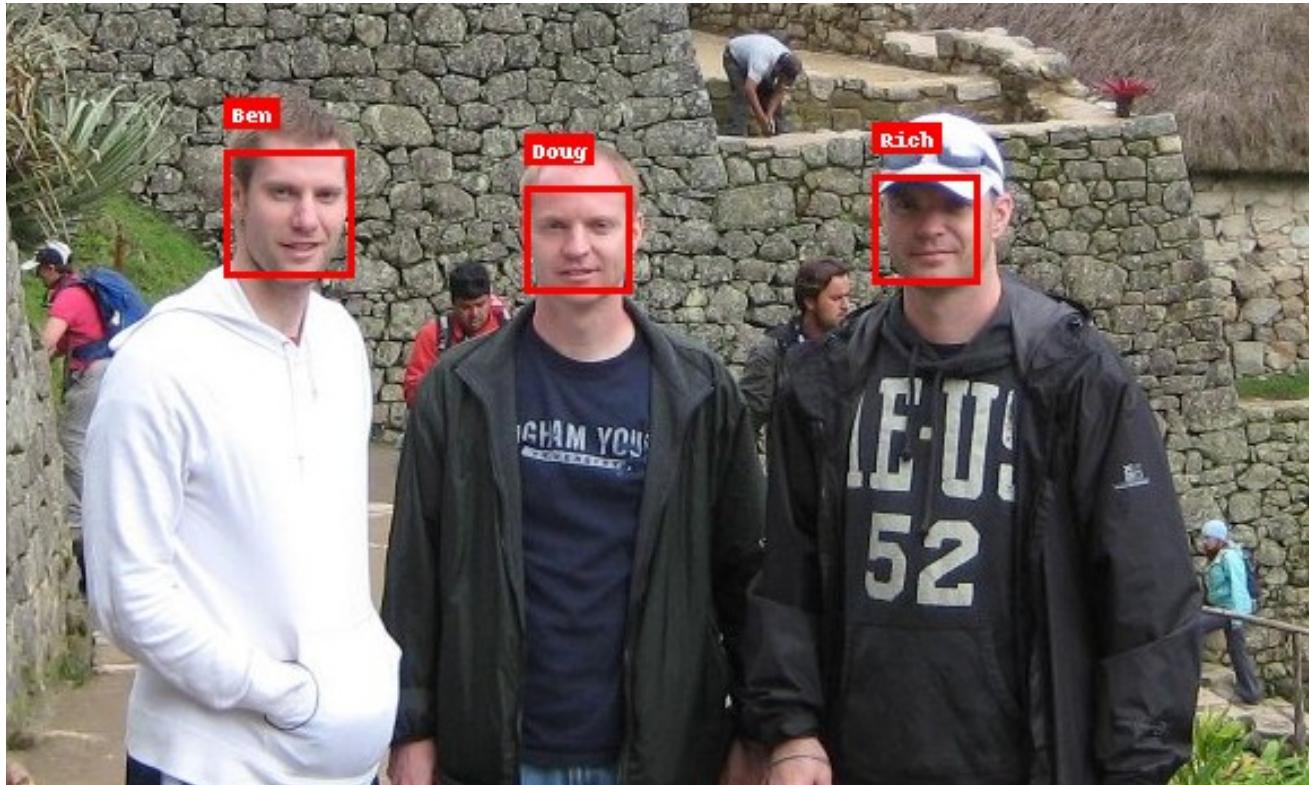
2005-2021



estimate=2009
error≈1.5 years

(individual errors ≈ 3 to 11 years)

Face Recognition

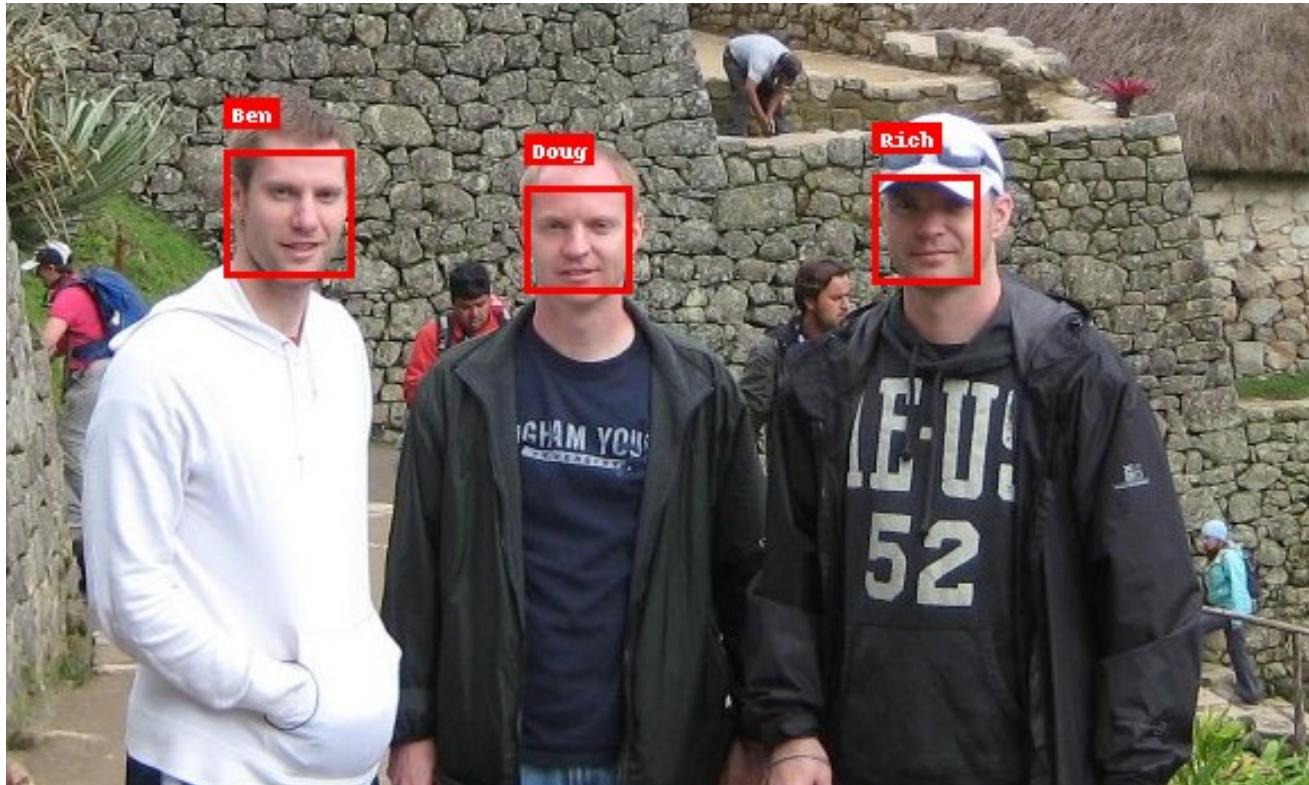


Who?

Comparing to all faces rarely necessary

- Face clusters
- Constrain by degrees of separation (Tree / HSN)
- Other constraints (location, time period, etc.)

Face Recognition



Photos can Inform Tree / HSNs

- Together in Photos → family, friends, groups (school, church, work, etc.)
- Higher probability of links

Example



“Mormon farmer and his family. Cache County, Utah.”
August 1940

Example



"Mormon farmer and his family. Cache County, Utah."
August 1940

1940 Census: **132,164,569**

Utah: **550,310**

Cache: **29,797**

Head (20-40) ≈ farmer*

Wife (19-35)

Daughter (1-4)

36 families

* Includes "farmer," "farming," "farm partner," "livestock farmer," "share cropper"

Example

36 candidate families

35: photo of husband or wife in FS*

31: a photo of both

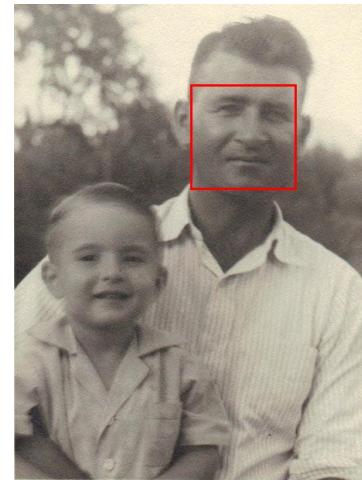
9: no “good” photo of either

(decent quality, close in age)

*95 photos manually downloaded to demonstrate results of using face recognition to solve the problem.

Top 3 Matches

1st



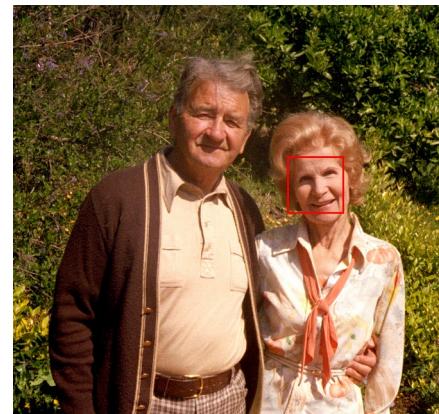
2nd



3rd



1st



2nd



3rd



(images courtesy of FamilySearch users)

Example

Why?

Grateful family - would have never known!

Zillions of photos of unidentified people



Example

If we hadn't found them:

We know who it isn't

Considerations

- State of the Art – still plenty of mistakes

ex: in a 7-person photo

20 yr-old → “51-69” yrs

10 yr-old → “20-32” yrs

2 people wearing glasses → “no glasses”

- Legal, Ethical, PR Issues

- Faces of living individuals only by explicit opt-in with informed consent (Illinois BIPA, more to come)
- Google (yes, that Google) no face recognition in cloud vision API, recently disabled gender

Places

Why?

- Context and setting
- Longitudinal studies in area
- Local trends, events
- Reduce search space (for other photos)

Places

- Map-based photo-sharing apps
(GPS/metadata)
- lifemap.com for historical memories
(depends on users)

Places

Where?

Computer Vision

+

records, tree, HSNs

(addresses, cities / towns)



Scene Text Recognition



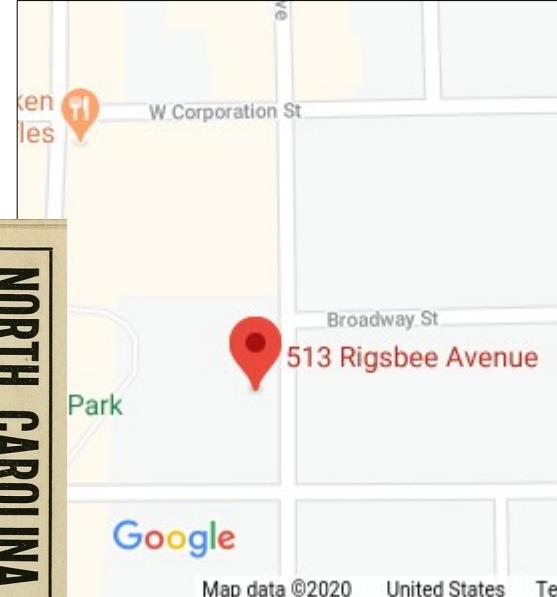
781

The Depositors National Bank
of Durham, N. C.
(Member F. D. I. C.)
"Seeking New Business On the Service We Render"

Center Restaurant 117 E Chapel Hill
Central Lunch 120 W Main
City Cafe 228 Rigsbee av
City Sandwich Shop 124 E Main
Costello's Cafe 1026 Cleveland
Dixie Cafe 118 W Chapel Hill
Dixie Inn (c) 210½ W Main
Durham Sandwich Shop 815 Fayetteville
Farmers Cafe 209 Morgan
Forrest Inn 1314 S Duke
Forks Inn New Raleigh Rd cor Holloway
Franklin Cafe (c) 118 S Pine
G & G Lunch 1203 Angier av
Goody Shop 1000-02 W Main
Grill & Fountain The 111 E Main
Harvey's Cafeteria 101 E Main
Hillside Sandwich Shop (c) 118 S Pine
Hollywood Inn Cafe (c) 118 S Mangum
TEL MALBOURNE COFFEE SHOP, 225 E Main, Tel F-176 (For further information see page 24 Buyers' Guide)
Ideal Diner 101 Rigsbee av
Jewell's Diner 2022 Auger av
Jones Drucilla A Mrs Carr
Kounts Jas 401 Rigsbee av
Lakewood Lunch 1912 Lakewood av
Lawn Laundry 801 E Main
Lincoln Cafeteria 101 S Mangum
Little Acorn 613 Rigsbee av
Lucky Clover Inn 402½ Carr
Lucky Strike Lunch Room 600 Carr
MALONE CAFE (c), 801 Fayetteville, Tel J-6221
Mangum Cafe 513 Rigsbee av
Manhattan Diner 1201 320 N Main
Manhattan Lunch 926 E Main
Mason Pearl 1022 3d
Midway Lunch (c) 414 E Pettigrew
Monticello Cafe 321 E Chapel Hill
Morris Bros 401 E Chapel Hill
Morris Elliott B 903½ Angier av
N G Cafe 215 E Chapel Hill
Old Star Cafe (c) 532 E Pettigrew
Oriental Restaurant The 116-18 E Parrish
PALMS RESTAURANT THE, 316 E Chapel Hill, Tel L-8021 (For further information see page 36 Buyers' Guide)
Paul's Place 712 9th
Pitts' Cafeteria 210 E Fayetteville
Planter's Cafe 502 E Chapel Hill
Plaza Cafe 210 N Corcoran
Poole Mary E Mrs 507 Morgan
Pratt Alex L 2413 W Pettigrew
R. W. Lumley 102½ E Main
Red Top Inn Roxboro Rd exid
Red's Diner 2106 Angier av
Reeves Geo W 711 E Main
Rinaldi's Grill 1117 W Main
Royal Cafe (c) 524 Pine
Slope Valley rd
Parish
South
N Mangum
Tanner rd
Tin
Wright's Barber 300 Foster

WASHINGTON DUKE TAVERNS, 207 N Corcoran, Tel F-101 (For further information see page 25 Buyers' Guide)
West End Lunch Room 3018 Hillsboro rd
West Side Lunch 1003½ W Chapel Hill

NORTH CAROLINA MUTUAL LIFE INSURANCE CO.
"NO HOME COMPLETE WITHOUT NORTH CAROLINA MUTUAL POLICIES"
Home Office, Durham, N. C.

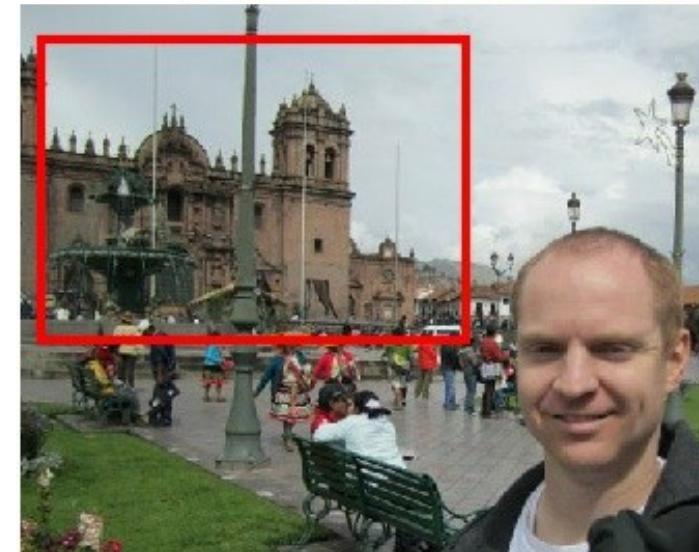
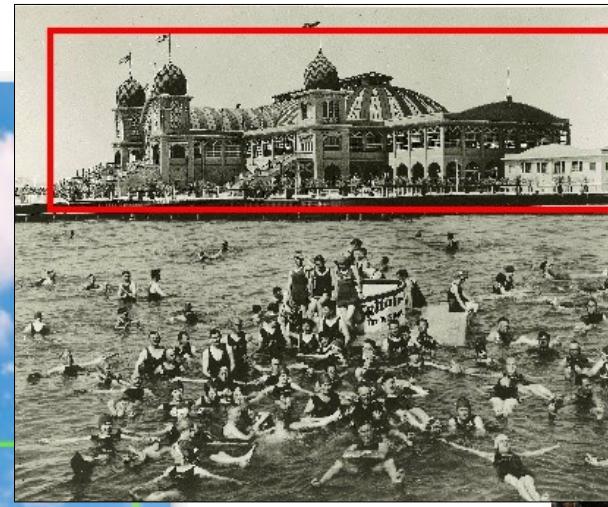
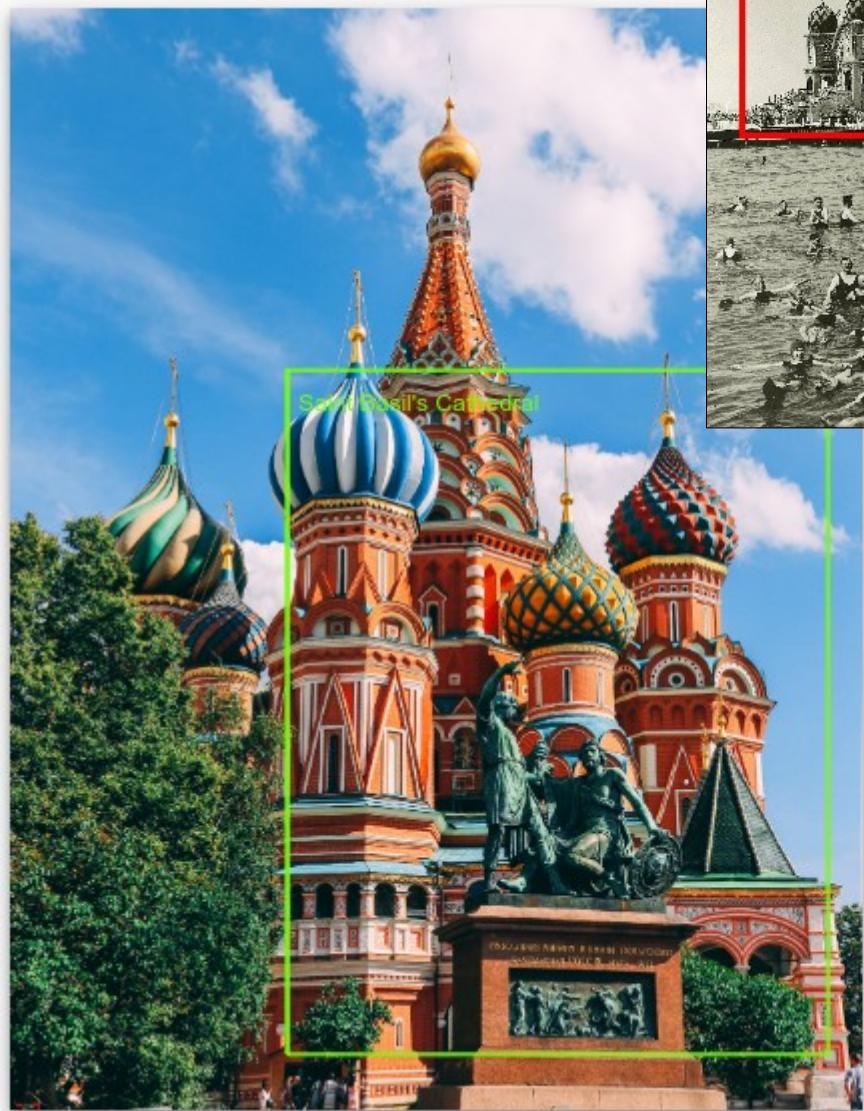


Scene Text Recognition

House Numbers Recognized



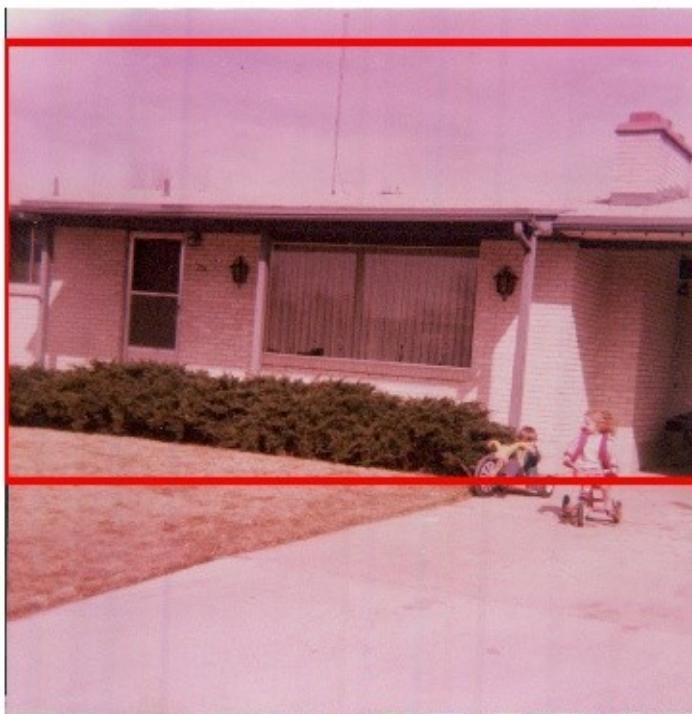
Landmark Recognition



cropped from image shared by Google under Creative Commons Attribution 4.0 License.
<https://cloud.google.com/vision/docs/detecting-landmarks>

Hyeonwoo Noh et al. "Large-Scale Image Retrieval with Attentive Deep Local Features" arxiv.org/pdf/1612.06321.pdf
Teichmann et al. "Detect-to-Retrieve..." https://arxiv.org/abs/1812.01584

Landmark Recognition



Landmark Recognition

- Dozens of photos
- Various angles
- Outside and Inside
- Various rooms



Can We Go Further?

Many buildings survive
Provo \geq 2,266 1940
343 1900

Use them as anchors
and project backward



3D → 4D



Original courtesy Provo City Library. Cropped, then colorized using Iizuka, et al. "Let There Be Color" SIGGRAPH2016.



Uses

- Better place recognition
- Discovery experiences
- Story telling
- History in general (not just FH)
- Other uses?

Conclusion

- Computer Vision can help us leverage information from photos
- Faces, Places in particular
- More uses for CV in FHT

Thank You!