



Evaluation of Face Recognition Algorithms for Disaster Events



Yotam Yaniv (yotamy@umd.edu)

Mathematics | Computer Science

College Park Scholars – Science & Global Change Program

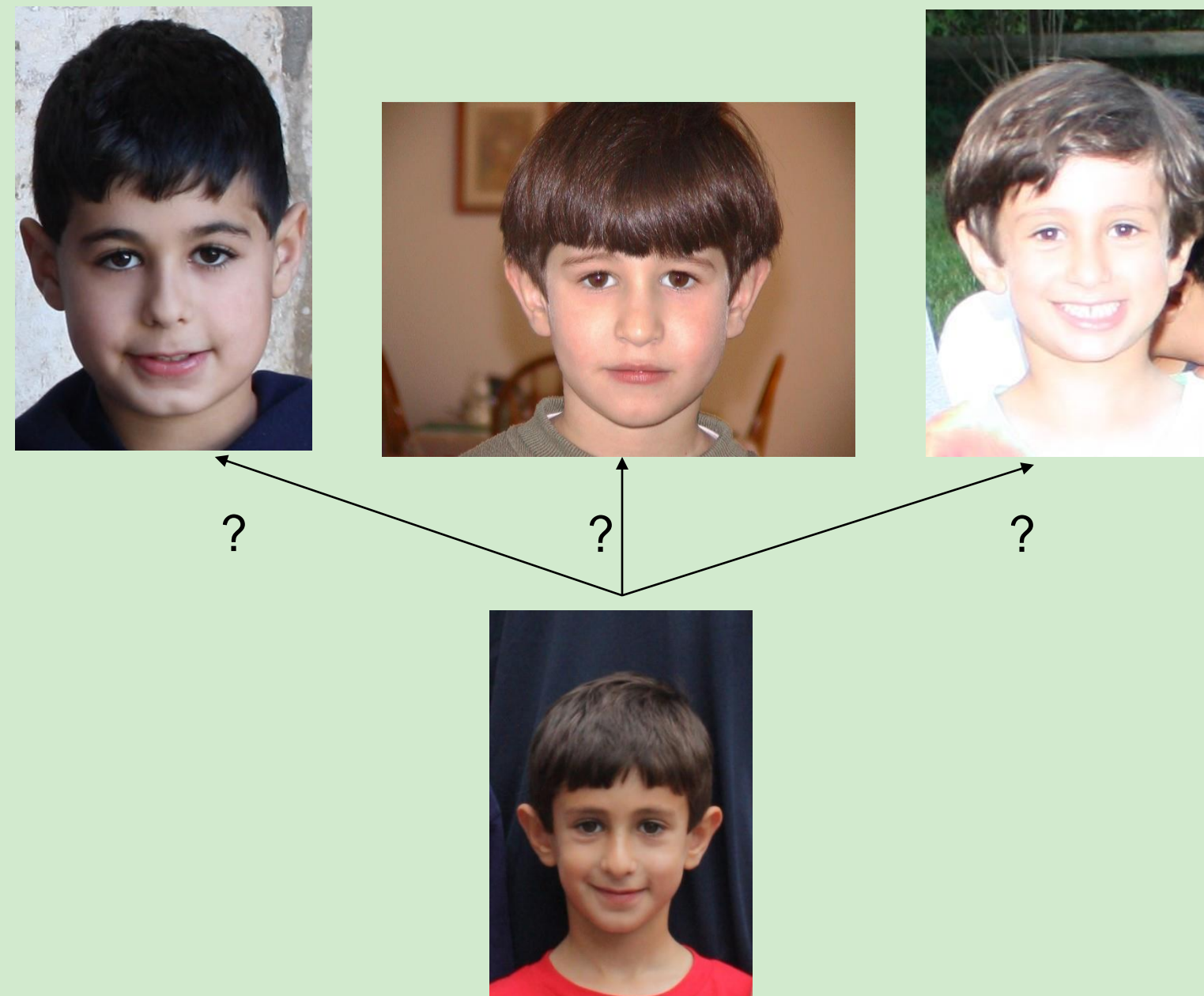
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Introduction



Post hurricane Katrina destruction - CNN news

During disaster events people are displaced in the chaos. The National Library of Medicine people locator project was launched in order to develop a web application which assists with the reunification of families during disasters.



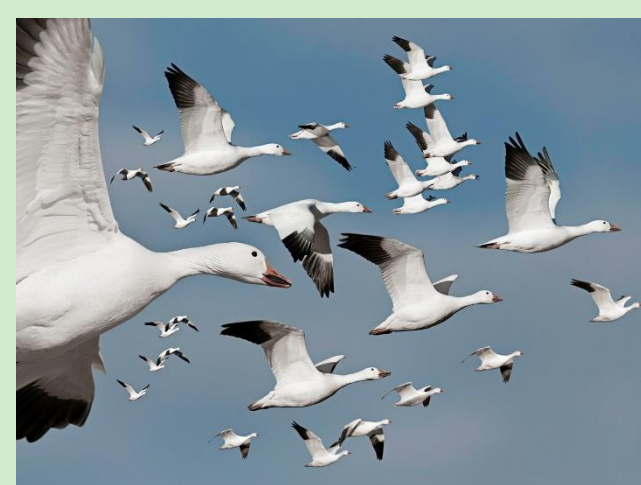
Which face matching algorithm is the best?

Methods:

In order to determine the best algorithm, the people locator team and I decided to use a standard benchmark:

Receiver-Operating-Characteristic (ROC) curves

- ROC curves: true acceptance rate (TAR) vs. false acceptance rate (FAR) for varying acceptance thresholds.
- $TAR = \text{true positives identified} / \text{total positives} \leq 1$
- $FAR = \text{true negatives identified} / \text{total negatives} \leq 1$
- First used in World War 2 to test the effectiveness of radar systems:

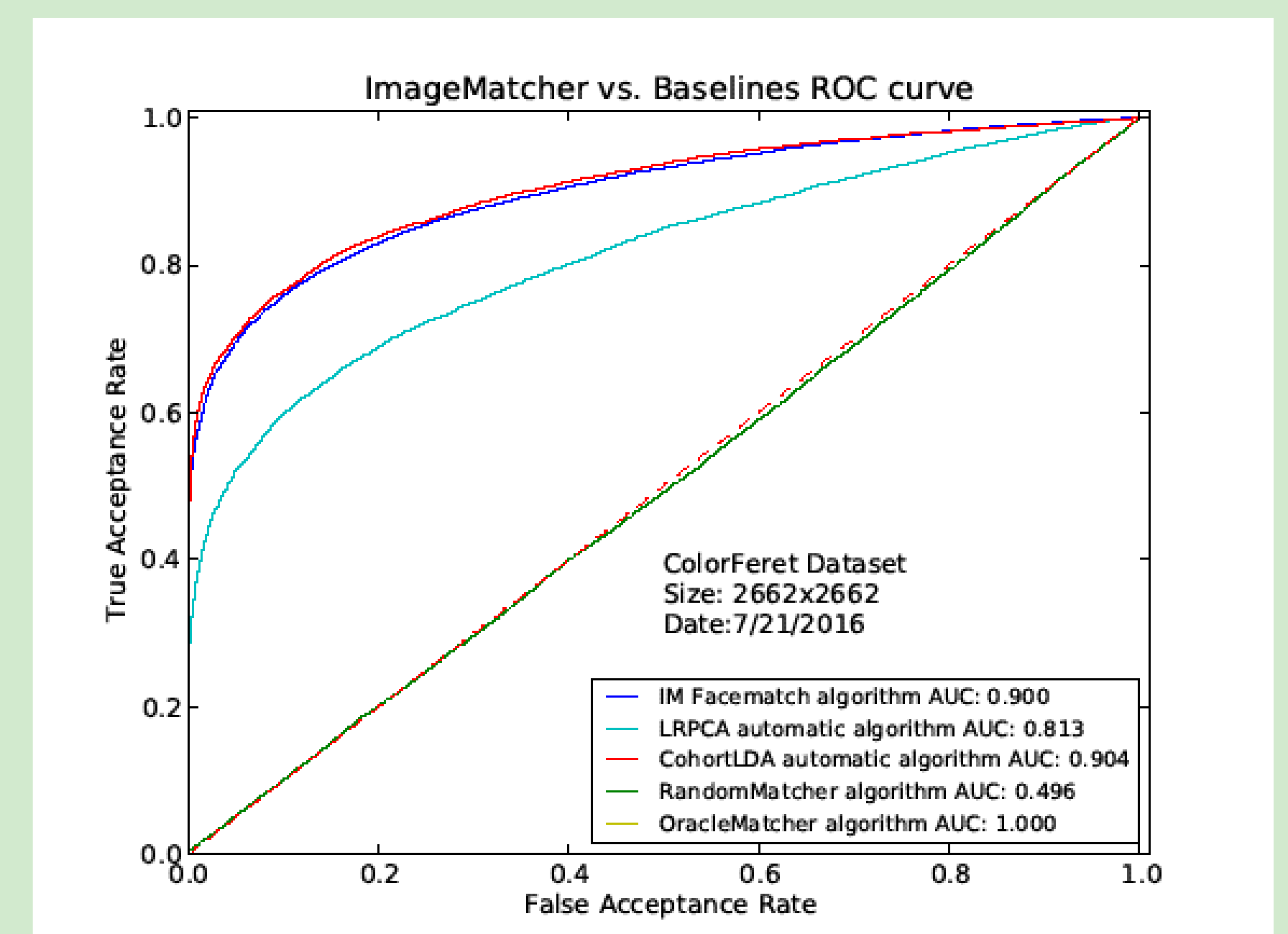


VS.



Results

- I implemented the testing software which produces ROC-curves in python
- Software produces ROC-curves of the people locator (IM Facematch) algorithm alongside standard baseline algorithms on multiple standard datasets
- Allows for quick on the fly testing and optimization of the algorithm
- Displays the Area Under the Curve (AUC) on the graph, the closer the AUC is to 1, the better the algorithm



Sample ROC-curve output on a 2662 image data set

Conclusion:

Extreme weather events are likely to occur more frequently in the future due to climate change, making people locator an essential tool for government agencies and the general public.

The People Locator application is being used around the world. Most recently to locate people lost in the mudslide in Mocoa, Columbia (April 1 2017) where at least 220 people were reported missing.

Site Information and Acknowledgements:

National Library of Medicine, National Institutes of Health

Address: 9000 Rockville Pike, Bethesda Maryland

Mission: "Seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability."

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NIH disaster response software interface

How People Locator Works:

- Photos of lost and injured people are uploaded to the database by hospitals, first responders and families
- People searching for missing individuals can report a lost person and upload a photo to the database
- People can search the database for a lost individual by name or with a photo of their face

