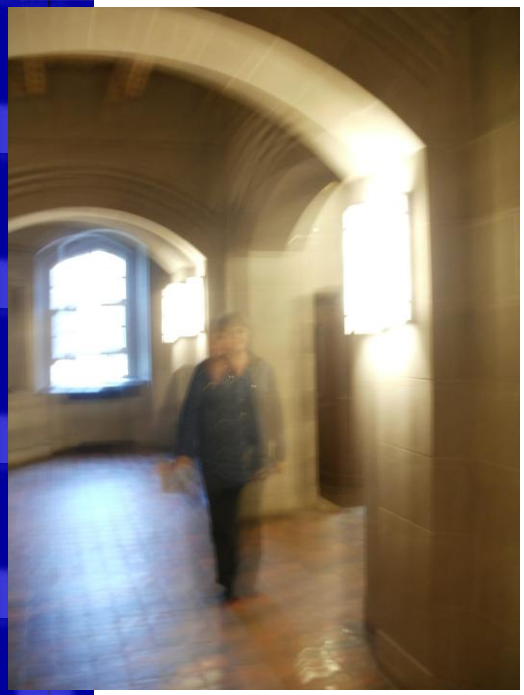
Face Quality and Analysis Challenge

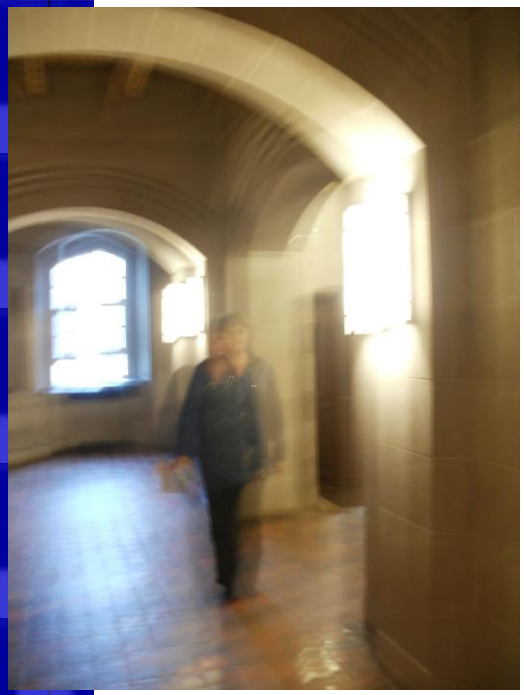
Dr. P. Jonathon Phillips
National Institute of Standards and Technology

Face Quality

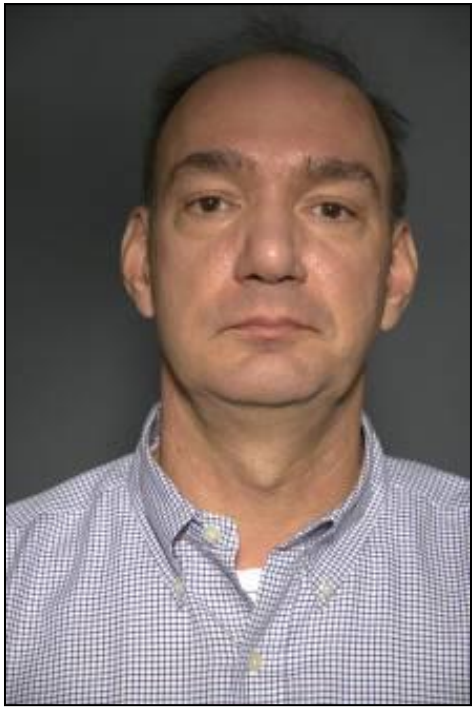


Low Quality

Face Quality

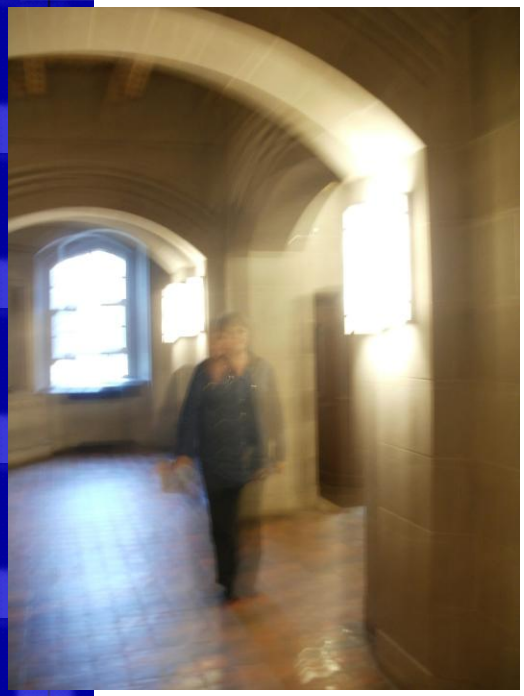


Low Quality



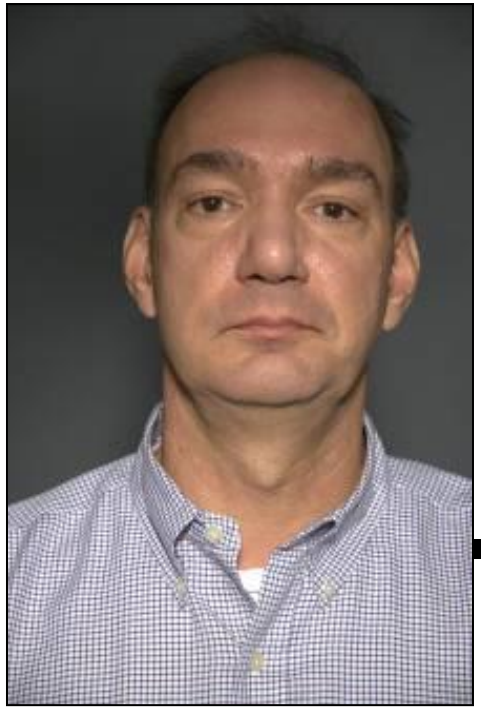
High Quality

Face Quality



Low Quality

Medium Quality



High Quality

How do we quantify this level?

The Good, the Bad, and the Ugly

- Encourage development of “hard” still frontal face recognition algorithms
- Three performance levels
  - Good
  - Bad
  - Ugly
- Nikon D70-6 Mpixels (SLR)

Good, Bad, and Ugly Face Pairs


Good

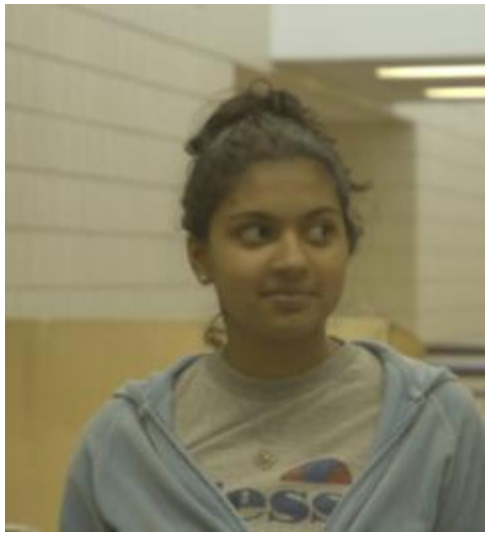

Challenging


Very Challenging

Good, Bad, and Ugly Face Pairs

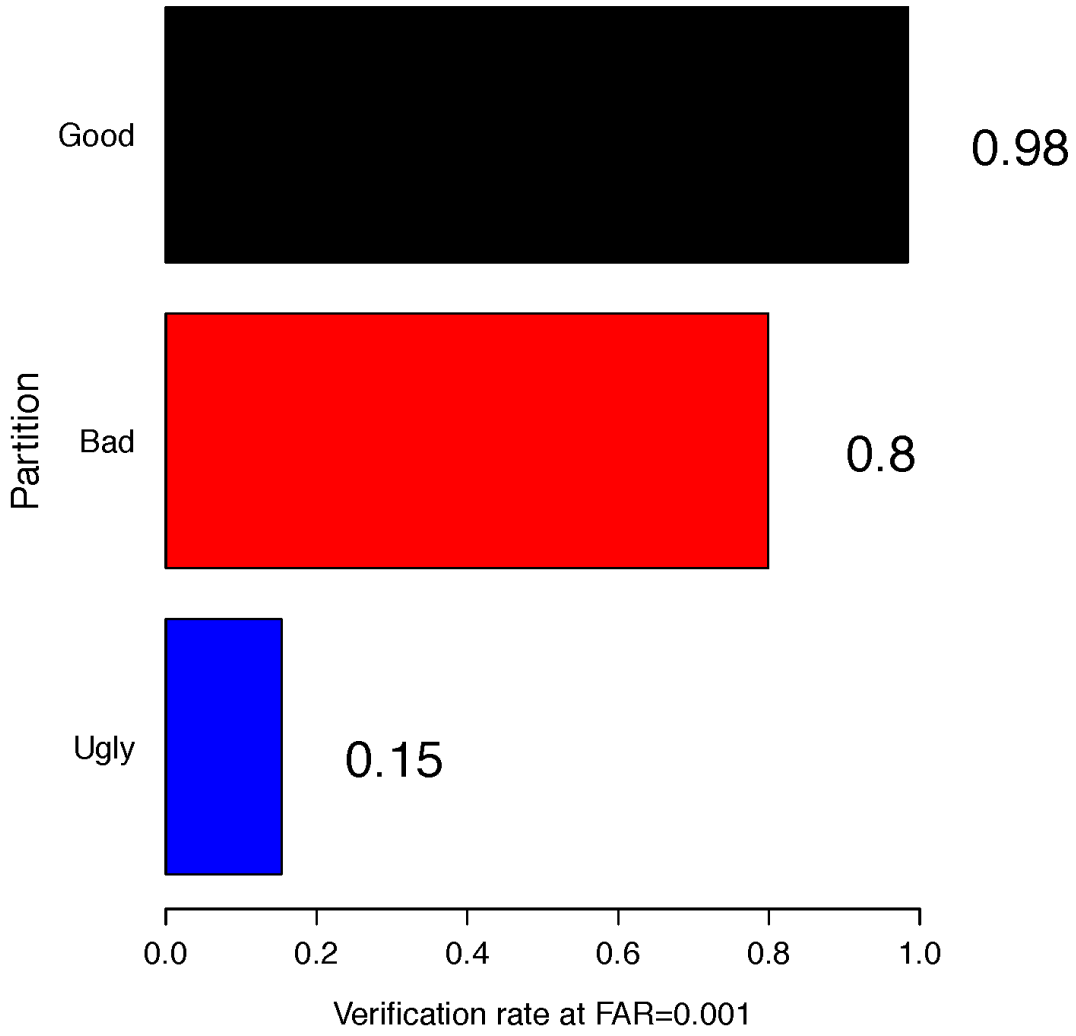

Good


Challenging

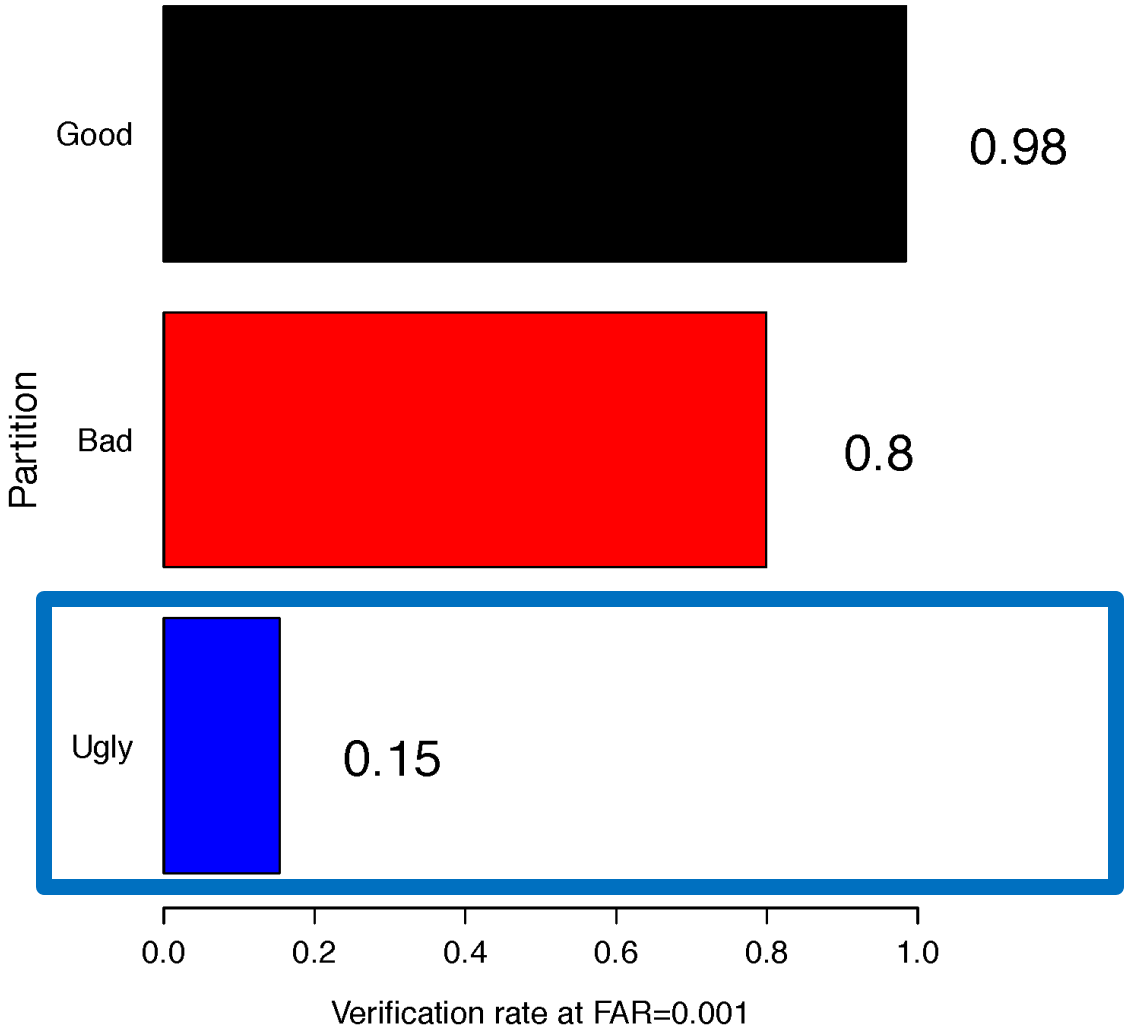



Very Challenging

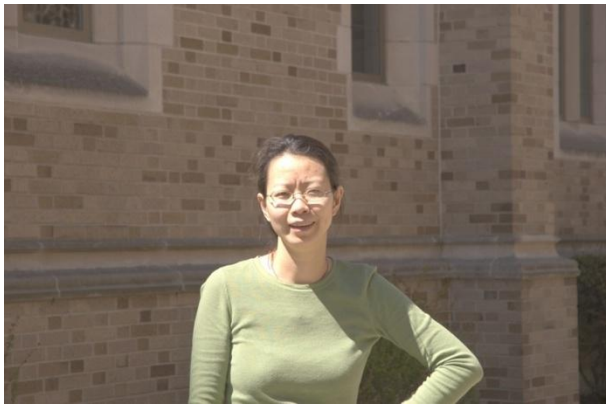
Good, Bad, Ugly Performance



Goal: Separate out Ugly Images



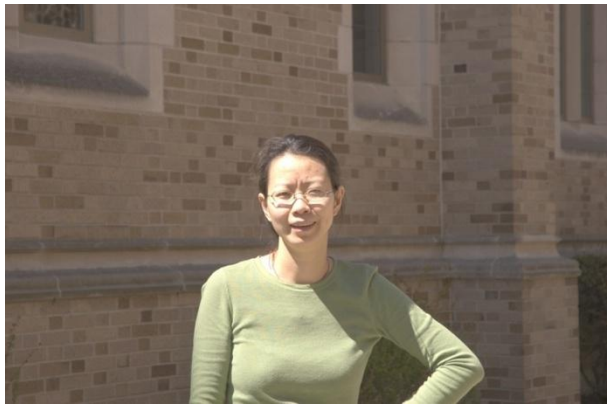
Why is this Hard?



What is the Quality of these images?

Quality Comes in Pairs

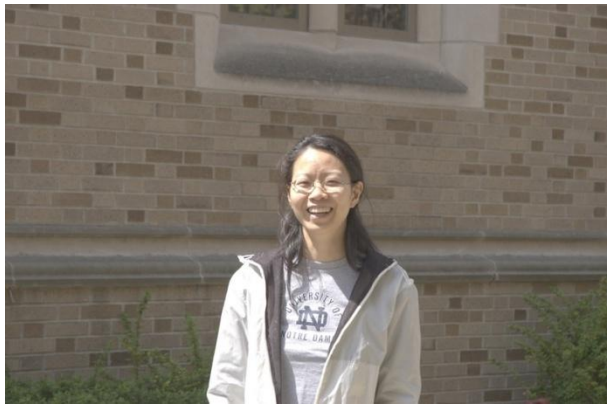
Hard to Match



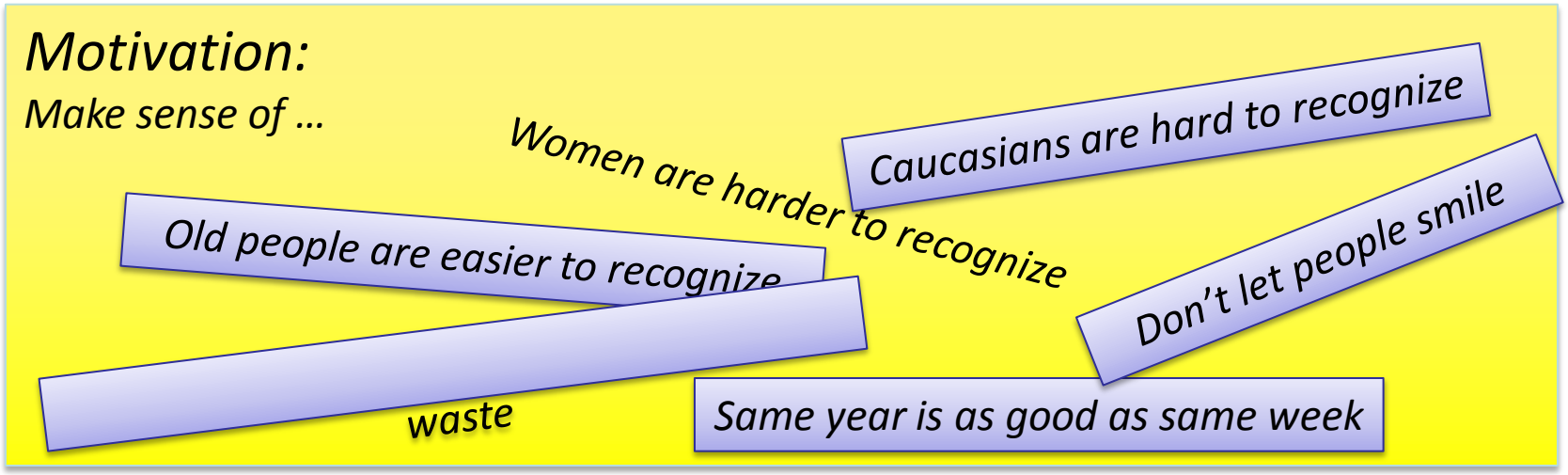
Easy to Match

Easy to Match

Hard to Match



Covariate Meta-Analysis

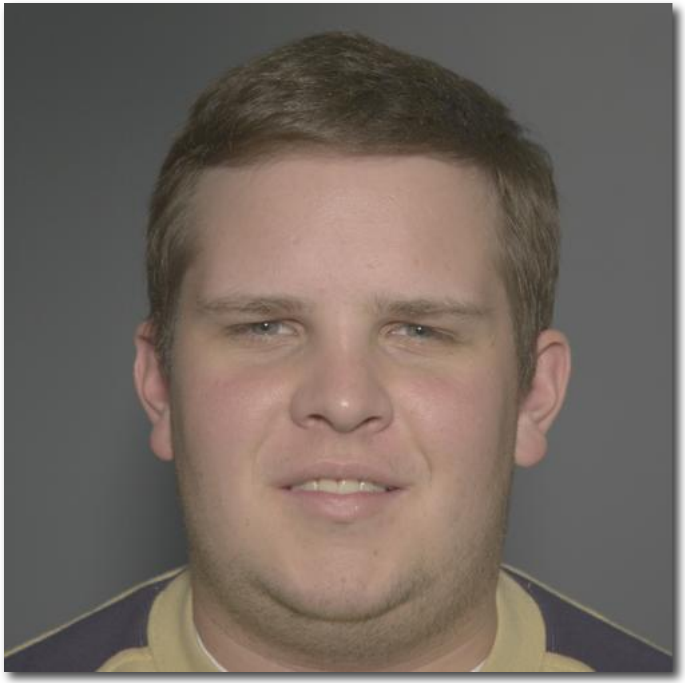


"A Meta-Analysis of Face Recognition Covariates," Y. Man Lui, D. Bolme, B. A. Draper, J. R. Beveridge, G. Givens, P. J. Phillips, In Proceedings, *Third IEEE International Conference on Biometrics: Theory, Applications, and Systems*, 2009.

What is a Meta-Analysis

- Covariate = Characterize Performance
  - Gender
  - Age
  - Expression
  - Quality Metric
- Analyzes performance results from multiple studies.
- Robust to changes in:
  - Data set
  - Algorithms
  - Environment / image conditions
  - Demographics
  - Sensors

Who is easier to recognize?



Young …

Older people are easier to recognize

Resolution

Best resolution varies over time.

Expression

Neutral to Neutral

Smiling to Smiling

Smiling to Neutral

Neutral to Smiling

Have a consistent expression.

Summary of Findings

AGE:

Older people are easier to recognize. (9 Studies)

TIME BETWEEN IMAGES:

Recognition degrades with time between images. (8 Studies)

GENDER:

Murky outcome, modest and depends upon study, algorithm, setting, etc. (8 Studies)

RESOLUTION:

Older algorithms don't care. Newer algorithms like more pixels. (10 Studies)

EXPRESSION:

Same expression better, Otherwise smile/neutral same. (4 Studies)

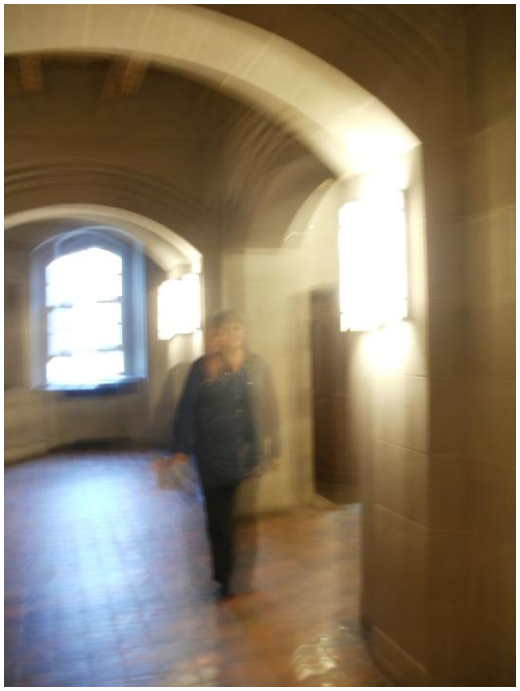
RACE:

East Asians easier, BUT, this may be because fewer East Asians in data sets. (6 Studies)

QUALITY MEASURES:

Currently no replicated results

Face Quality Analysis Challenge



Low Quality

Medium Quality

Strategy One:
Clearly tagging low quality images

Strategy Two:
Characterizing "medium" quality images

Proposed NIST Face Activities

- **Face Quality Analysis Challenge**
- **Video Challenge**

Thank you