# What is the Challenge for Deep Learning in Unconstrained Face Recognition?

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## Face Image Partition based on Quality

- Examine the impact of face image quality changes
- Partition face images into High, Middle and Low qualities
- Evaluate FR performance across quality variations

## Quality Partition on Databases


## Recognition Protocol

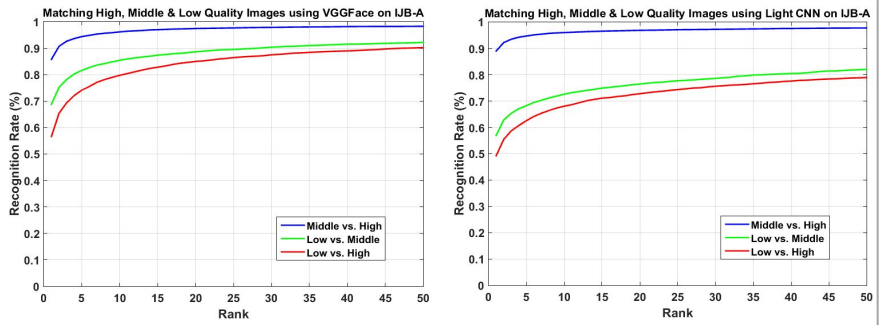
- Face Identification
  - ✔ low vs. high; middle vs. high; low vs. middle
- Face Verification
  - ✔ All pairs are generated;
  - ✔ low vs. high; middle vs. high

## Deep Learning Methods

- Choose 4 representative deep models for evaluation and comparisons
  - ✔ VGGFace (O. M. Parkhi et al, 2015)
  - ✔ Light CNN (X. Wu et al, 2015),
  - ✔ CenterLoss (Y. Wen et al, 2016)
  - ✔ FaceNet (F. Schroff et al, 2015)

## Face Recognition Evaluation

- Identification




- Verificatio

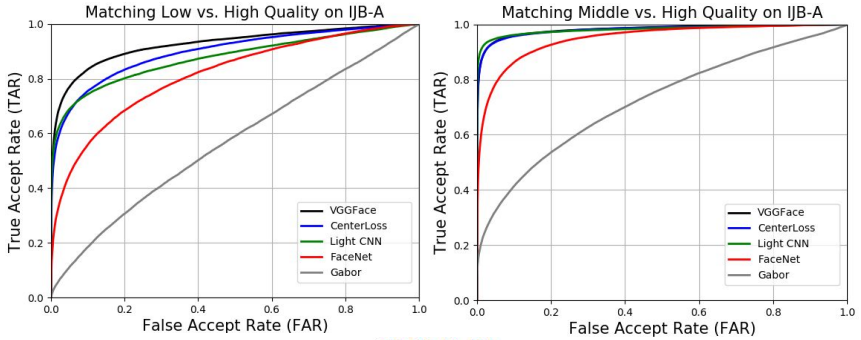



TABLE IV

VERIFICATION ACCURACIES OF DIFFERENT METHODS UNDER FAR = 0.01 AND 0.001, RESPECTIVELY.

| DataSet | Model | Low vs. High | | Middle vs. High | |
|---|---|---|---|---|---|
| | | FAR=0.01 | 0.001 | 0.01 | 0.001 |
| IJB-A | VGGFace | 0.605 | 0.367 | 0.858 | 0.675 |
| | Light CNN | 0.566 | 0.402 | 0.905 | 0.808 |
| | CenterLoss | 0.521 | 0.313 | 0.859 | 0.692 |
| | FaceNet | 0.257 | 0.100 | 0.586 | 0.330 |

## Discussion

- One of the grand challenges is the significant quality changes between face images in matching
- One promising direction is to further improve the capability in building the relations between face images with large quality gaps