

Impact of Occlusion Removal on PCA and LDA for Iris Recognition

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Person Identification by Iris Recognition

[1] http://www4.comp.polyu.edu.hk/~csjgyk/ITD/Database_Iris.htm
 [2] <http://www.prevention.com/beauty/makeup-how-tips-enhance-eye-color>
 [3] <http://www.grace-tp7.eu/en/content/stakeholder-consultation-database-issues>
 [4] <http://www.clipartshoop.com/camera-clipart-1038697.html>
 [5] http://www.clipartpanda.com/clipart_images/business-people-group-in-6212621

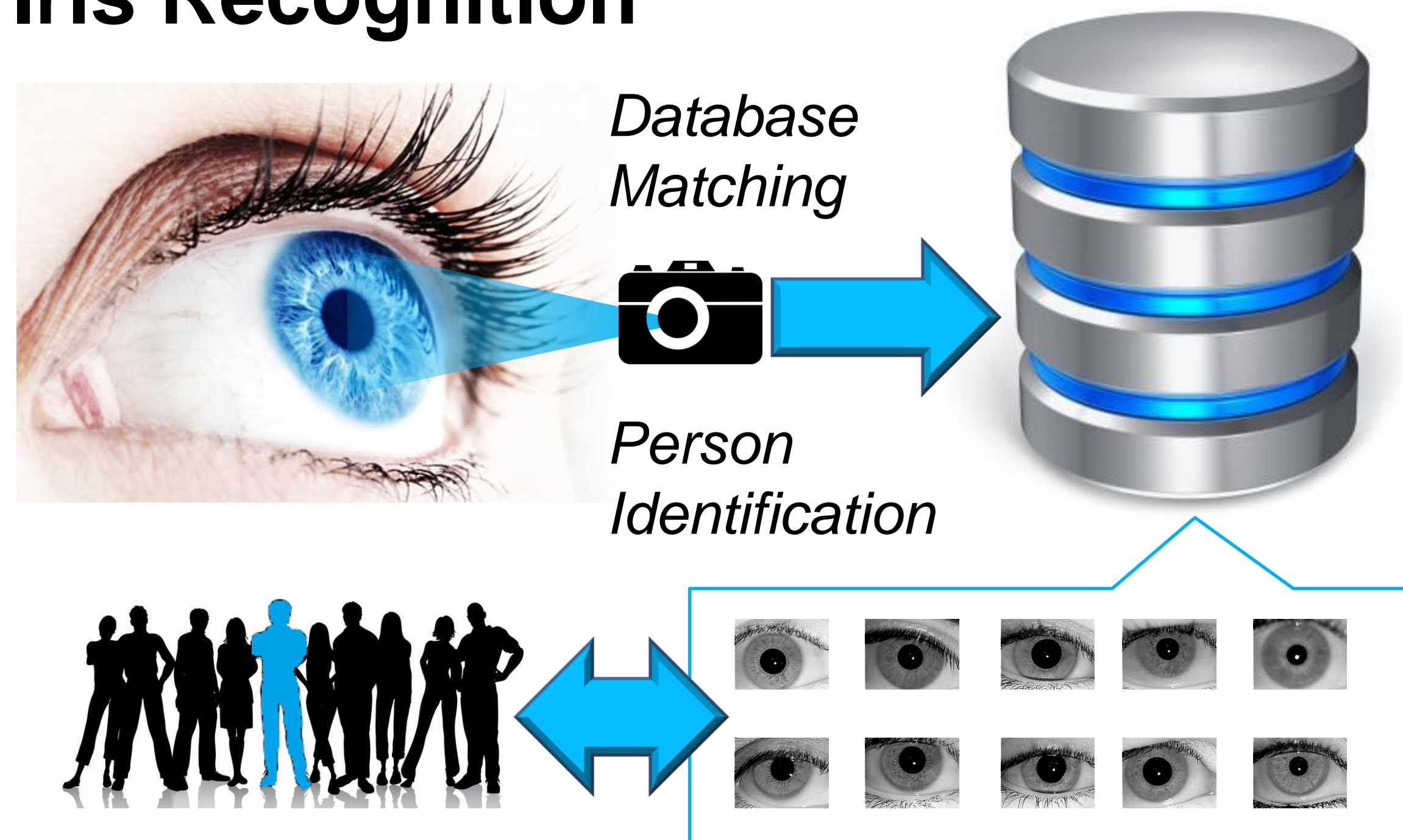
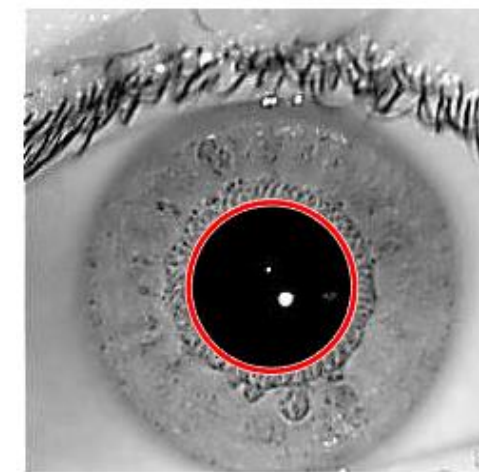


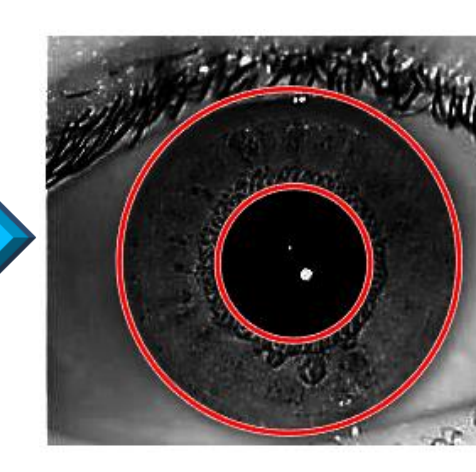
Image Segmentation & Occlusion Removal

1. Pupil Segmentation



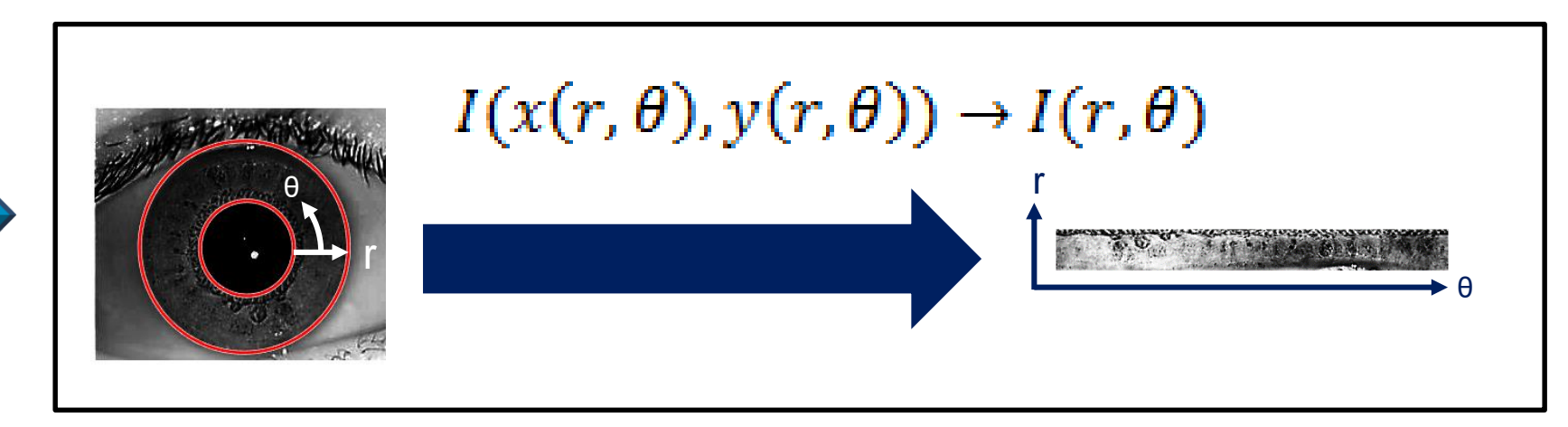
- Largest connected shape

2. Iris Segmentation



- Circular Hough Transform

3. Iris Normalization



- Iris features preserved using with varying sizes

4. Occlusion Removal

Option A: Keep As-Is



- Control group for experimental results

Option B: Keep Left Side Only



- Removes upper eyelashes

Option C: Eyelash & Eyelid Removal using Parabolas



- Dilate with 4x4 square
- Fit parabolic on each side

PCA and Fisher LDA Analysis

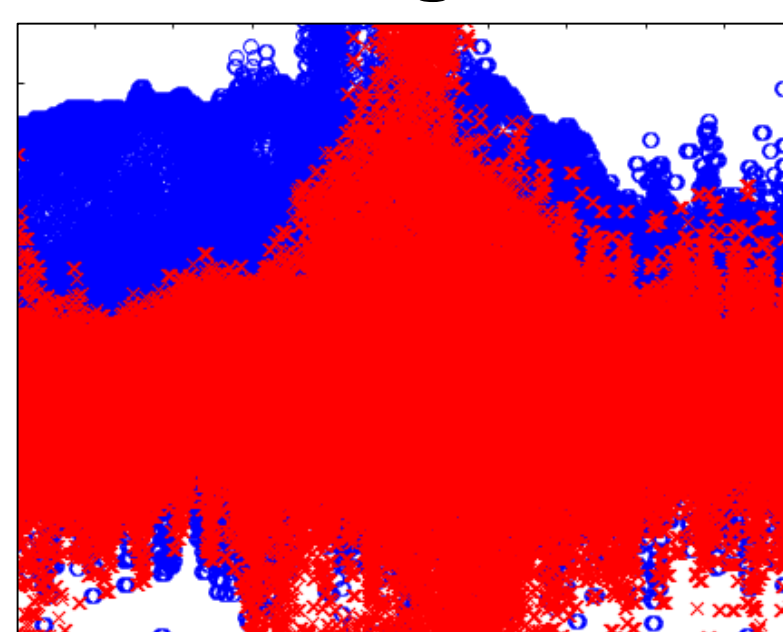
- PCA eigenvectors using covariance matrix S

$$S^H S \vec{v}_i = \lambda_i \vec{v}_i$$

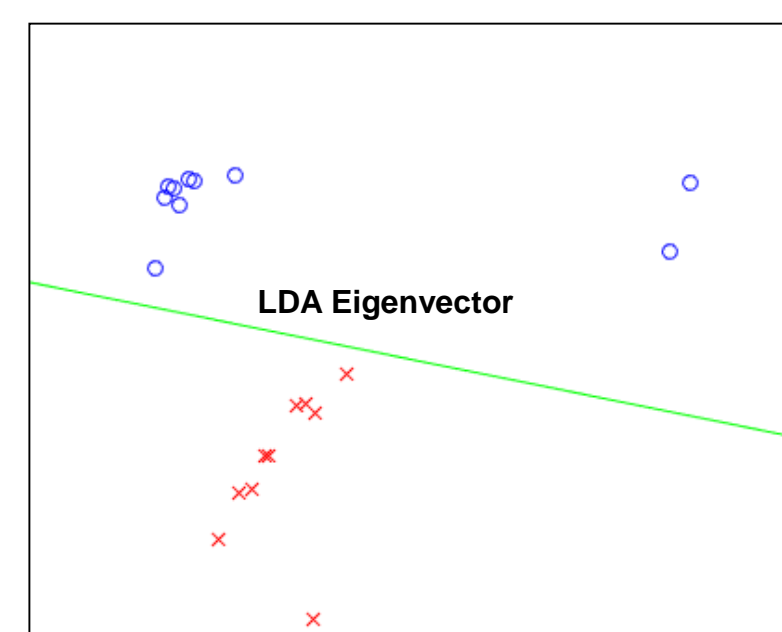
- LDA eigenvectors using RB and RW

$$W_{opt} = \arg \max_W (\det(WRW^H)) = \arg \max_W \left(\frac{\det(WR_B W^H)}{\det(WR_W W^H)} \right)$$

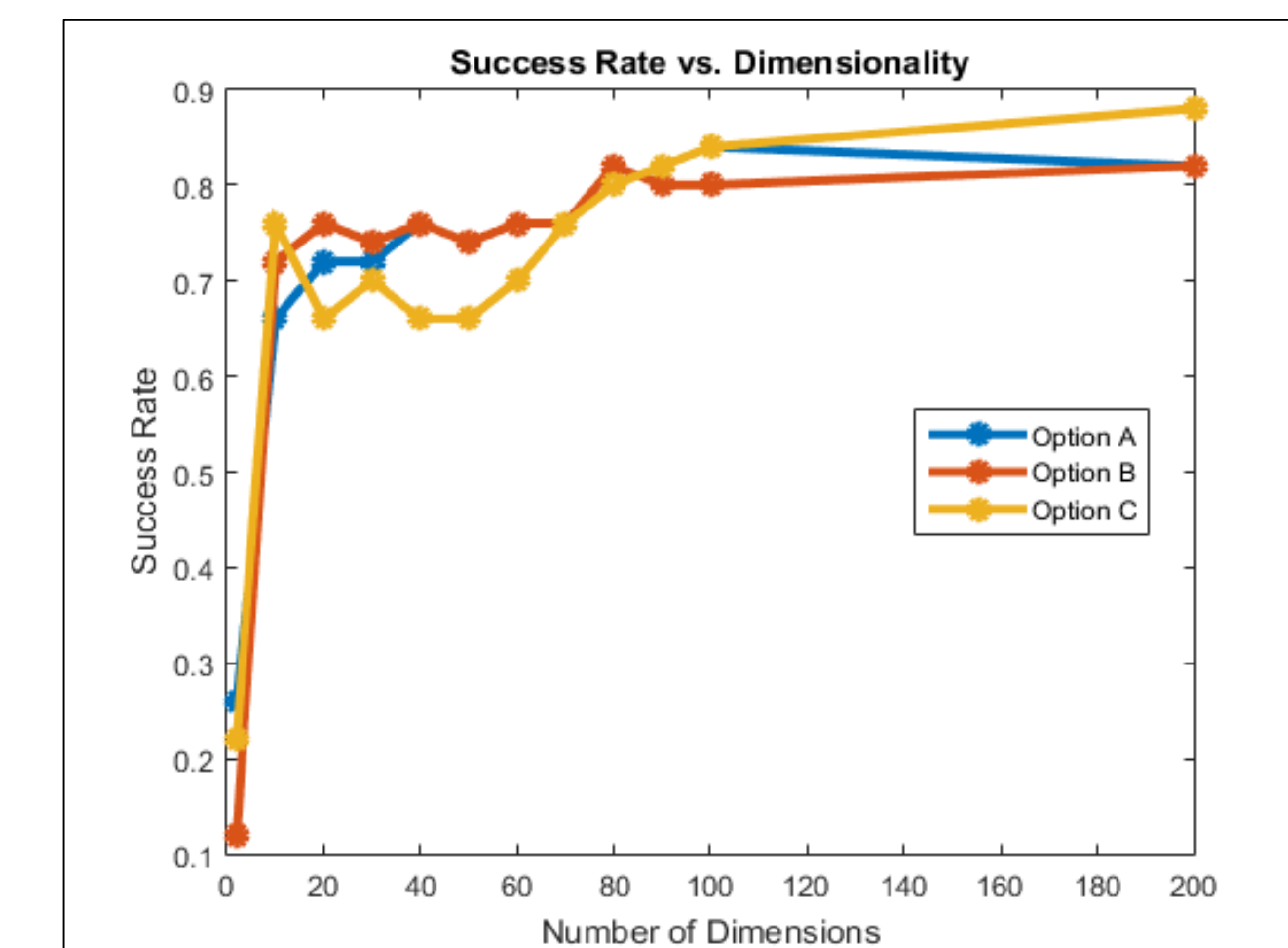
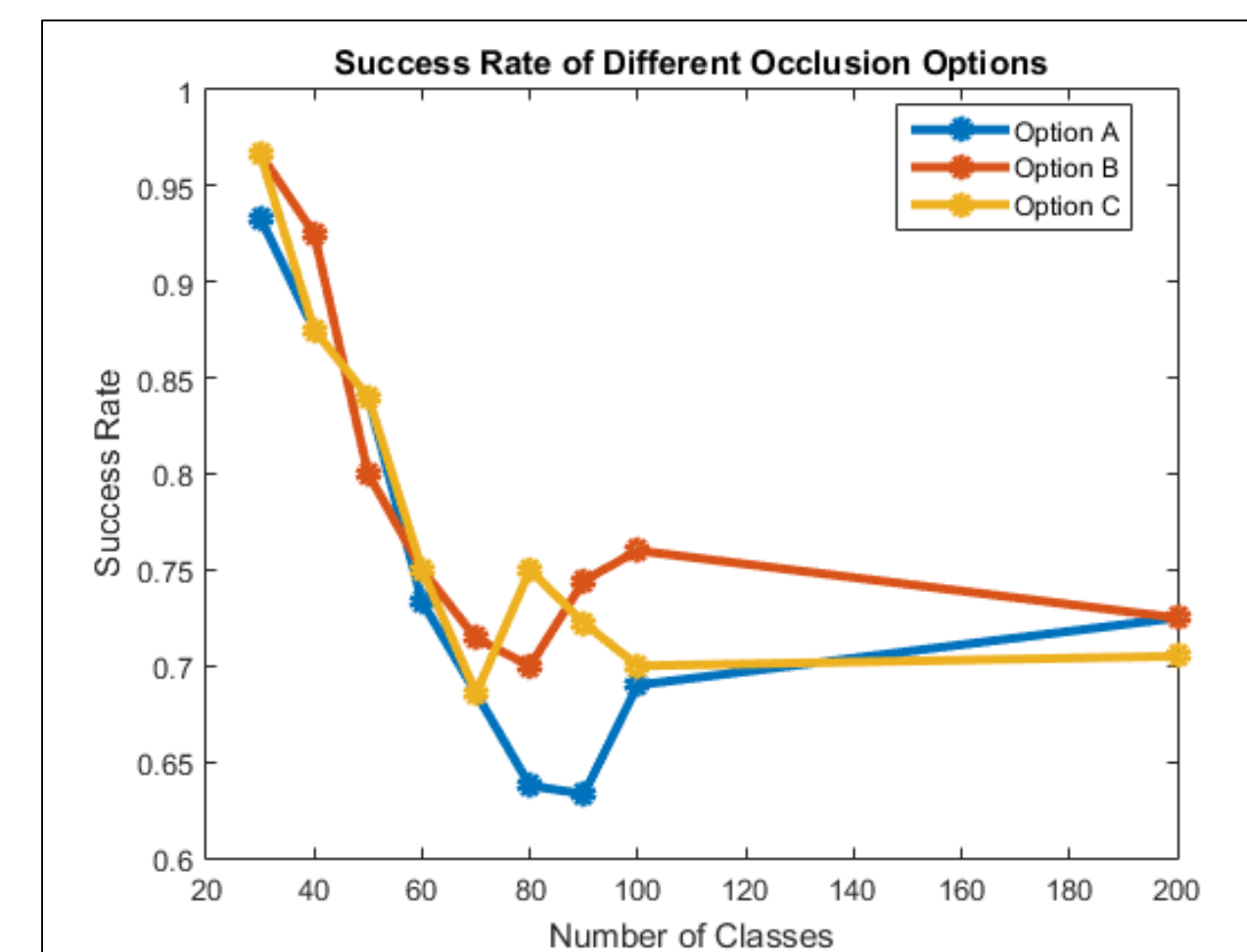
Raw Image Data



LDA Projections



Experimental Results



Eyelash removal improves results slightly; equal or worse performance to Option B