Facial Recognition System

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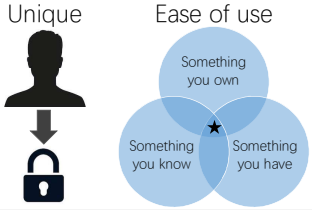
Background and Objective

Challenge of secure login

Authentication methods	Factors to consider			
	Fast	Secure	Easy to implement	Easy to use
Passwords	✓		✓	✓
Secure physical key		✓		
Facial Recognition		✓		✓

Passwords are security risk!



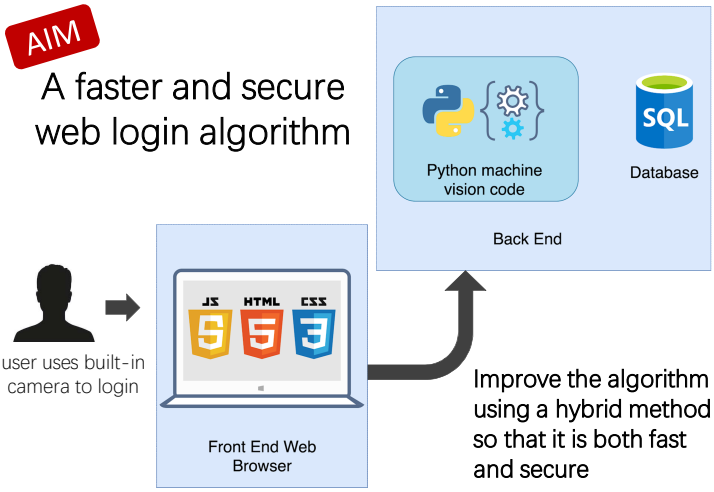
Facial Recognition (a better method?)

current algorithms:
- accurate
- slow
- hard to implement

→ trade-off between speed and accuracy

AIM

A faster and secure web login algorithm



user uses built-in camera to login

Improve the algorithm using a hybrid method so that it is both fast and secure

Methodology

(1) Design classification algorithm

(2) Test image classification accuracy with Yale Face A dataset

→ Scale algorithm to use in web login

→ Create hybrid algorithm by including feature extractor to improve the accuracy

→ Test accuracy of new algorithm in web login

Results and Discussion

Classification Algorithm – Nearest Neighbour (k-NN)

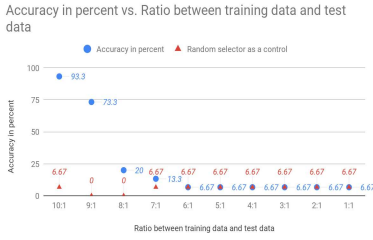


Figure 1: Summary of data collection result

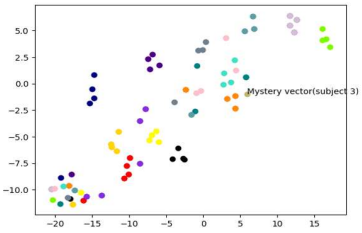


Figure 2: Scatter plot with 9 data points

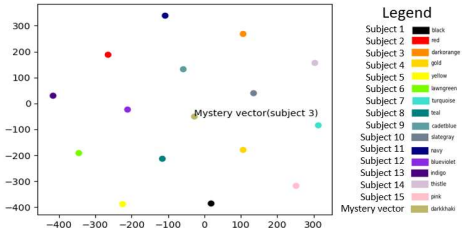


Figure 3: Scatter plot with 1 data point

Accuracy is reduced with less training data

Figure 1,2 and 3 showing the results of the simple classification algorithm as well as the visualised data. We can see that as the number of images used gets lower, there are lesser data points for comparison of the new data that will have to be tested

Hybrid Algorithm

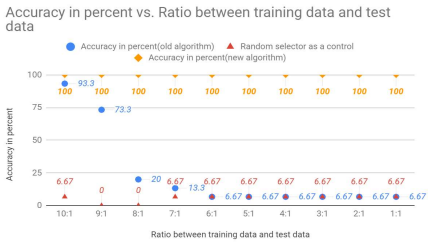


Figure 4: Summary of data collection result

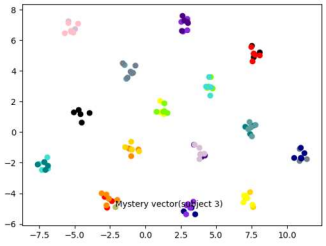


Figure 5: Scatter plot with 9 data points

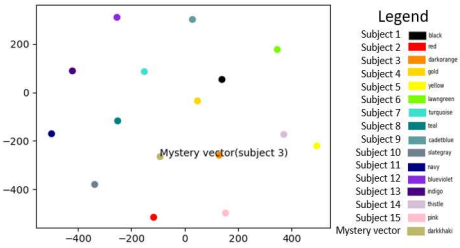


Figure 6: Scatter plot with 1 data point

Significant improvement in accuracy even with reduced training data 93.3%

Figure 4,5 and 6 showing the results of the new classification algorithm tested on the same dataset with significant improvement in the accuracy at 93.3%

Conclusion and Further research

Hybrid algorithm

Faster

More accurate

Future Work

Improve low light performance of the algorithm

References

Most common passwords used as web logins
https://edition.cnn.com/2019/04/22/uk/most-common-passwords-scli-gbr-intl/index.html

Belhumeur, P., Hespanha, J., & Kriegman, D. (1997). Eigenfaces vs. Fisherfaces: Recognition Using Class Specific Linear Projection. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 711-720.

All Figures are self-drawn