**CHAPTER 4**

**RESULT AND DISCUSSION**

RESULTS

**Results for objective 1: Existing Algorithm**

Illumination problem is one of the existing algorithm’s reasons in providing inaccurate results. The algorithm has no way of being aware when an image input has a certain illumination issue and tend to continue on with the face recognition procedure even without resolving the issue which can ultimately cause inability to recognize an input image, thus making less accurate results in recognition.

**Results for objective 1: Proposed Algorithm**

Input images’ image data that has illumination problems (too bright or too dark) are optimized and adjusted accordingly. The proposed algorithm has the capacity to identify the image’s illumination status whether it’s normal, too bright, or too dark. The desired illumination is determined by the training faces’ image data mean and it will be the basis of the input image illumination status. This prevents the algorithm to proceed to the facial recognition procedure without resolving illumination issue, thus increasing the recognition accuracy.

**Results for objective 2: Existing Algorithm**

**Results for objective 2: Proposed Algorithm**

**Results for objective 3: Existing Algorithm**

The PCA’s Dimension Reduction was intended to improve the processing level efficiency of the computation of the covariance matrix. However, its efficiency can only be maintained under a specific condition. Such condition is where ***M*** is lower than ***N2.*** However, ***M*** can continuously increase in number while ***N*** remains constant. On that note, the Dimension Reduction continuously increases the processing level, the exact opposite of its intended purpose, as the value of ***M*** increases as shown in **Graph 4.1**.

***M***

***Graph 4.1****: Size growth of Covariance Matrix as* ***M*** *increases using* ***ATA*** *formula.*

**Results for objective 3: Proposed Algorithm**

The proposed algorithm reverts back the computation of the covariance matrix to its original form (***AAt***) once the Dimension Reduction can no longer serve its purpose which is when ***M*** reaches a value higher than ***N2.*** Following this procedure, the processing level can be maintained as low as possible and will not increase uncontrollably, thus preventing increasingly large computations to take place as shown in **Graph 4.2**. In this case ***N = 50, N2 = 2500***.

***M***

2500 2500

***N2***

This is where the computation for Covariance Matrix switches to ***AAT***

***Graph 4.2****: Size growth of Covariance Matrix as using proposed formula.*

DISCUSSION

**Eigenface Illumination Issue**

The Eigenface algorithm has always been sensitive to illumination which means that proper image illumination matters a lot in producing accurate results. Allowing the algorithm to attempt recognition of an input image which has illumination issues will be the most likely cause of inaccurate results. The algorithm will be improved to give a first-hand solution to the illumination issue before it proceeds for facial recognition. Adding this procedure will reduce Eigenface’s sensitivity to illumination and improve the algorithm’s overall in terms of handling and resolving the issue better.

**Dimension Reduction**

The Dimension Reduction can certainly reduce the efficiency of the algorithm in the long run due to the increasing number of ***M***. However, this does not mean that it will be completely removed from the system. It is actually quite effective and reliable when the system is still in its infancy. The proposed algorithm offers only to revert the formula for the covariance matrix back to its original form once the Dimension Reduction reaches its peak and unable to provide its intended purpose anymore.