

# **IPSC Project Progress Report**

**Title:** Parallel Face Recognition Using SVD

**Team Members:**

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**Deliverables:**

- Implementation of face recognition using open mp
- Observing the various aspects of our implementation using other approaches like
  - k-NN
  - Nearest Mean
  - K Means
- Applying PCA for dimensionality reduction by using SVD

**Technologies to be used:**

- C++14
- Python 3
- Open MP
- Intel MKL libraries ( Eigen Library )
- C++ Boost library(to be used for primitive operations)
- GNU Plot

## **Implementation Approches:**

### **Nearest Mean ( serial implementation ):**

Accuracy: 90%

Execution Time : 0.020303 sec

### **Nearest Mean ( parallel implementation ):**

#### **Threads: 2**

Accuracy: 90%

Execution Time : 0.226169 sec

#### **Threads: 4**

Accuracy: 90%

Execution Time : 0.068082 sec

#### **Threads: 8**

Accuracy: 90%

Execution Time : 0.081548 sec

### **K-NN ( serial implementation ):**

#### **K = 4:**

Accuracy: 91.25%

Execution Time : 0.060538 sec

#### **K = 10:**

Accuracy: 76.25%

Execution Time : 0.098322 sec

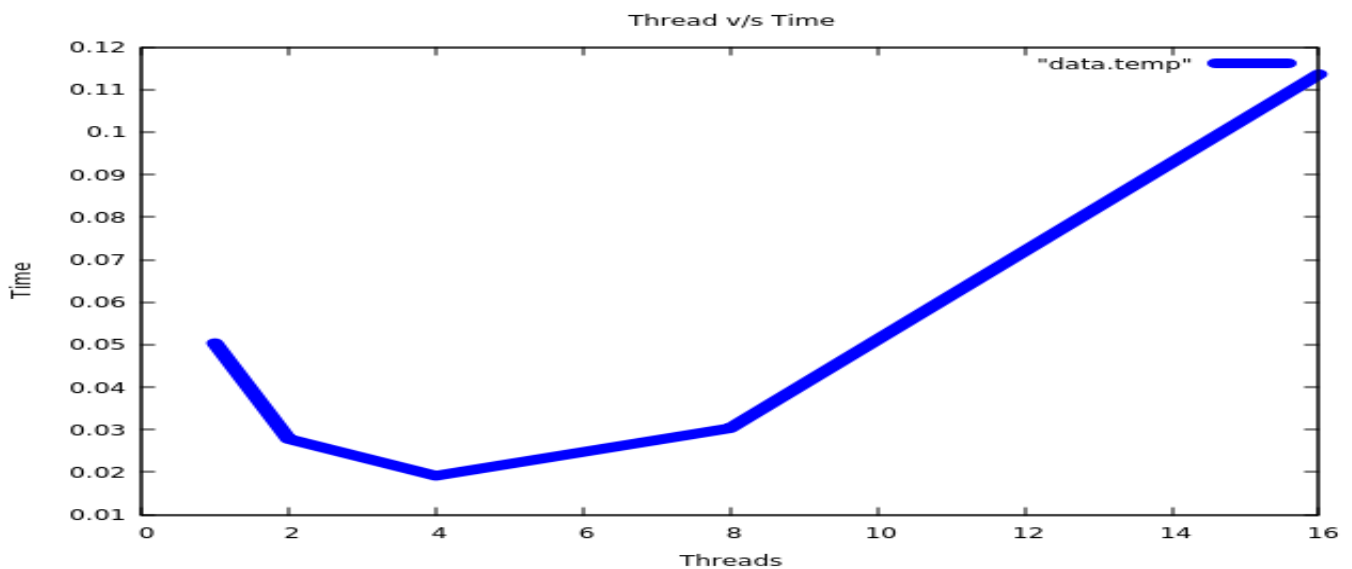
## Visualization:

It is performed for parallel implementation of algorithms

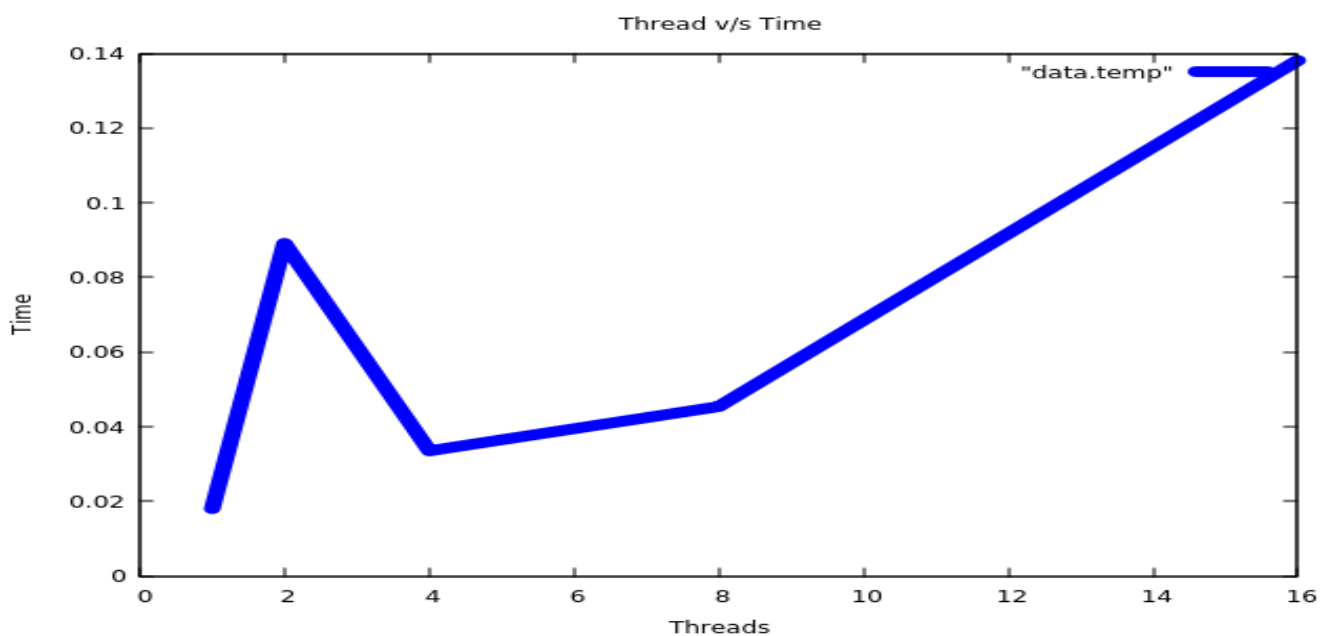
No of threads vs time

No of processors vs time

### Threads vs Time Means (execution #1)



### Threads vs Time Means (execution #2):



## **Observation:**

- As the number of threads increases, time taken for execution is reduced.
- The reduction in time is till we approach a threshold ( when number of threads exceeds number of available cores )
- As number of threads increases the execution time increases ( seen beyond #threads > no\_of\_cores (8) )

## **Resources :**

- Face Recognition Using Singular Value Decomposition of Facial Colour Image Database  
Reference:  
<https://pdfs.semanticscholar.org/cdab/c8ec5e0629752980f8cb613a56a33efb05c7.pdf>
- Face Recognition using Eigenfaces and Distance Classifiers  
Reference\_  
<https://onionesquereality.wordpress.com/2009/02/11/face-recognition-using-eigenfaces-and-distance-classifiers-a-tutorial/>
- Face Recognition Using Tensor SVD Chapter 14  
Book : Matrix Methods in Data Mining and Pattern Recognition

## **Github Repository :**

<https://github.com/chittaranjan-rath/Parallel-Face-Recognition>

## **Probable DataSets:**

- <https://facedetection.com/datasets/>
- <http://www.face-rec.org/databases/>

## **Assumptions:**

The datasets were collected with the assumptions that the algorithm implementation is performed only for face recognition. Face detection is currently beyond the scope of project.

## **Testing Plan:**

Various analysis criteria such as

- Comparison of serial vs parallel execution
- Speed up w.r.t number of threads(equal or less than number of cores)
- Speed up w.r.t number of threads(may be more than number of cores)
- Observe the factors of memory bound and computation bound in algorithm
- Performance (accuracy) of parallel face recognition algorithm