Parallel Computing on Android Platform
Divesh Soni (dms6244@rit.edu)
Advisor: Dr. Mohan Kumar

Introduction
• Work-sharing model for load balancing built on mobile platform can utilize other mobile phone’s resources to enhance efficiency in terms of computational time and battery consumption.
• Being ubiquitous, mobile phones in the vicinity can offer resources opportunistically in real-time.

Objective
• Perform experimental analysis to determine efficiency of utilizing the available mobile resources around versus using cloud services to perform the same task.
• Develop an image-sharing Android application that would perform face recognition in parallel to evaluate the efficiency of the two aforementioned approaches.

Background
• Image sharing Android application is developed wherein a user sends an image of a target person and receives images from other devices that have the target person.
• Kairos Face Recognition & Human Analytics API is used for performing face recognition.

Implementation

Parallel Computing

Master
• Maintains TCP connections with all slaves.
• Send the image of target person and then waits to receive all matched images.

Slaves
• Perform face recognition and transfer of matched images in parallel.

Image Compression
• Images are compressed and converted to PNG format to maintain consistency and speed up their transfers.

Face Recognition
1. Registration
• Each target person to be recognized must be enrolled in face database with at least one image.
• Each image is mapped to a unique subject ID, gallery ID pair.
2. Recognition
• Given image is compared with all the subjects in the specified gallery.

Results
Using four devices for testing, considered N most recent images for face recognition where N = 10, 50, 100, 150 and 250

Battery Consumption vs No. of Images

Increasing up to seven devices for testing had no significant change in the computational time or battery consumption values.

Conclusion
Using resources from available phones is faster and more battery efficient than using cloud services as the number of images to be processed increase beyond a threshold of 10-15 images.

Future Work
• Allow user to specify a date range to narrow down number of candidate images that undergo face recognition.
• Add security mechanisms to ensure integrity of transferred data.

References