Mobile Computing - Winter 2024
Assignment 3 – Sensing and Native Code – 80 + 40 marks;
Deadline: Apr 18, 9pm

1. (a) Write an app that collects data from the accelerometers and shows in real-time the orientation of the smartphone (in terms of three angles). Note that the phone need not be still when the app is actually run, so the values may keep changing. A second activity of the app is that it also collects the orientation over time in a database, and then shows its history in the form of three graphs.

    (b) Take the history as a text file on your desktop, and treat it as a time series to predict the next 10s of values. Plot the predicted vs actual values in this way. Now, change the sensing intervals to three other values, and repeat the same process.

2. While Android's libraries provide a lot of functionalities, it does not provide any technique of running neural network in Kotlin. However, it has a neural networks API for native code. Write a program that collects a set of images, and runs any form of convolutional neural network on them to classify them.

What and How To Submit

- The Kotlin/Java/C and Gradle program sources, along with XML. Composition needs to be used wherever appropriate. Use of XML files are also allowed, but their id's need to be used to make the changes wherever necessary.

- A readme text file, explaining the way the implementation has been done.

- Uploading to github via a private repository is a must. The submission needs to be made to BOTH Google Classroom and github.

Grading Rubric

For Q1,

1. Using the SensorManager to collect data – 10 marks

2. Proper creation of two activities – 10 marks

3. Creation of database and schema – 10 marks

4. Storage of data in database – 10 marks

5. Export of data from smartphone to computer – 10 marks

6. Use of prediction and plotting of accuracy – 10 marks

7. Change of sensing intervals – 10 marks

8. Working app with github repos – 10 marks

For Q2,

1. Running of basic native code – 10 marks

2. Utilization of Native Neural Networks API – 10 marks

3. Activity to load images (either from camera or from a file) – 10 marks

4. Running of the prediction (proper running and output is important, but very high accuracy is not needed) – 10 marks

Late Submission Policy

- -0.25 per hour for the first 96 hours.

- Submissions beyond 4 days of delay would only be accepted with official leaves of absence.