Ira A. Fulton Schools of Engineering
Arizona State University

CSE 535: Mobile Computing

SmartHome Gesture Control Application: Part 1

Purpose

Gesture-based SmartHome devices have the ability to increase convenience, but also create more accessible SmartHome devices for the elderly and those with disabilities. In this project, you will develop an application service that will control SmartHome devices with gestures, and then develop a RESTful application service for classifying the SmartHome gestures. This project provides hands-on experience developing a mobile application and provides an excellent opportunity to gain further exposure to topics and applications in the areas of mobile computing and machine learning.

Description

To complete Part 1 of this project, you will develop an application service that will control SmartHome devices with gestures. You will gain hands-on experience developing a mobile application using Android Studio.

This part of the project is peer-graded and reviewed by the course team for fairness and accuracy. The overall project accounts for 40% of your grade.

Objectives

At the completion of this individual project, learners should be able to:

- Develop an application service that will control SmartHome devices with gestures
- Develop a mobile application using Android Studio

Technology Requirements

- Android Studio
- Either MatLab or Python
- YouTube account for video submission

Directions

For Part 1, you will develop a mobile application with the listed functionalities:

A. The user is shown a video of a gesture.
B. The user can replay the video at least 3 times.
C. Upon clicking the “PRACTICE” button, the user can capture his or her own video through the smartphone’s front camera for a period of at most 5 seconds.
D. The videos are uploaded to a server.

The mobile application should have three (3) screens:

1. **Screen 1:** A drop-down menu of 17 different gestures will be shown on this screen. Once a single gesture is selected, the user will be taken to Screen 2.
    a. Gesture list: {Turn on lights, Turn off lights, Turn on fan, Turn off fan, Increase fan speed, decrease fan speed, Set Thermostat to specified temperature, gestures one for each digit 0,1,2,3,4,5,6,7,8,9}
2. **Screen 2:** The video of an expert performing the gesture will be shown on this screen. Screen 2 will have another button that says “PRACTICE”. Once this button is pressed, the user will be taken to Screen 3.
3. **Screen 3:** In this screen, the camera interface will be opened for the user to record the practice gesture. The video will be captured for **5 seconds**, and the video will be saved with the following filename format:
    - [GESTURE NAME]_PRACTICE_[practice number].mp4
    - Use the following tables for gesture names:

Gesture - Action	**Gesture Name**
Turn On Light	LightOn
Turn Off Light	LightOff
Turn On Fan	FanOn
Turn Off Fan	FanOff
Increase Fan Speed	FanUp
Decrease Fan Speed	FanDown
Set Thermostat to specified temperature	SetThermo

Gesture - Number	**Gesture Name**
0	Num0
1	Num1

2	Num2
3	Num3
4	Num4

5	Num5
6	Num6
7	Num7
8	Num8
9	Num9

Screen 3 will have another button that says “UPLOAD”. Once this button is pressed, the user will be able to upload the gesture to a local server. Moreover, clicking this button will take the user back to Screen 1.

Expert Videos

The file ExpertGestures.zip contains video clips of the above gestures that you will use for the example shown on Screen 2. This zip file is available in your Coursera course.

Gesture creation

You will create at least three (3) correct video versions of each gesture for a total of 51 videos. You will use the best of these as the expert gesture to be shown on screen 2 of the application. You can practice as many times as you want. You will upload a .zip file of your gestures. Name your files as follows.

- [GESTURE NAME]_PRACTICE_[practice number]_[USER LASTNAME].mp4
- [LAST NAME]_[FIRST NAME]_Gestures.zip

Videos should focus on only showing the gestures. Do not show your face. Surroundings should be kept out or kept to a minimum in the videos.

Local Server

Develop your own local server on your own computer. It is recommended to use Flask as your local server.

Demo Videos

You will submit a demonstration of the application being used. For the demo video submission, record an application demonstration for Parts A-C. Begin recording from when you start the application and show all of the required functions.

Videos should focus on only showing the gestures. **Do not show your face**. Surroundings should be kept out or kept to a minimum in the videos.

Submission Directions

There are three parts to submit.

Parts 1 and 2: You will submit two zip folders: one containing your source code and the other containing your recorded videos. Save the files with the naming convention:

- SourceCode_[Full Name].zip
- Videos_[Full Name].zip

When you are ready to submit, you can upload one file for each assignment submission page on the "My submission" tab. If there is an error in your assignment, you may make corrections and resubmit.

Part 3: To submit the demo video link, you should create an account on Youtube or Vimeo or another hosting service and upload the required video for the assignment to that account. This deliverable will be completed and submitted through a peer review assignment.

Evaluation

The Demo Video will be peer-reviewed based on the following yes/no rubric:

- Is the user shown a video of a gesture? 10 pts
- Is the user shown a video of a gesture? 10 pts
- Upon clicking the PRACTICE button, can the user capture his or her own video through the smartphone’s front camera for a period of 5 seconds (at most)? 10 pts

Testing Environment for Grading

If possible, please use one of the environment settings listed below to avoid receiving the wrong grade. Occasionally, a source code will not work correctly when the development environment is different from the listed environments. If this occurs, we are not able to give you the correct grade because it is not easy to find the reason why your application failed.

- Pixel 8
- API 29

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This assignment is worth a total of 120 points. The “Points Awarded” column represents the number of points that will be awarded based on the condition in the “Condition” column.

Condition	Points Awarded
The user is shown a video of a gesture.	**20**
The user can replay the video at least 3 times.	**20**
Upon clicking the “PRACTICE” button, the user can capture his or her own video through the smartphone’s front camera for a period of at most 5 seconds.	**20**
The videos are uploaded to a server.	**20**
Individuals will perform each gesture three (3) times and upload three (3) correct versions of each gesture for a total of 51 videos each.	**40**