Professionalism & Artificial Intelligence Case Project

Ben Fielding
Charlie Adair
Jake Cowton

Speech and gesture control for music streaming service Spotify

Project Description

The project will focus on the creation of a Kinect-driven interface to the Spotify music streaming service, the system will make use of the skeleton-tracking and Kinect speech recognition functionalities.

The core of the project will be to train the system to learn standard gestures for play, pause and skip forwards and backwards. Voice control will also be made available for these functions, but also for mute and volume changing.

If more time is available for development, users should be able to create their own custom gestures for certain commands. This would be completed using a semi-supervised algorithm.

Requirements Specification

Product must be able to recognise core functionality gestures or voice commands for the following functionality:

- Play
- Pause
- Skip forwards
- Skip backwards
- Mute
- Volume up
- Volume down

Product should be able to recognise other possible gestures or voice commands:

- Play specific track
- Play specific album
- Search for artist/track name/album name/etc..

Product could be able to recognise other possible gestures or voice commands:

- Record custom gestures
- Share track with friends using Spotify's social media components (i.e "SEND (track-name BY (artist-name) TO (Spotify Friend name).
- Facial recognition as a security component at user login

Choice of Methods

- Gesture recognition - An artificial neural network will be used to classify gestures
- Custom gesture training and recognition - Semi-supervised system using initial labelled gesture combined with further online training
- Speech recognition - This will be completed using the built-in functionality of the SDK

Quality Assurance Techniques

Testing strategies

- Unit Testing - Method/Class level
- Program Testing - All classes together
- System Testing - Full application
- Performance Testing - Scalability
- Acceptance Testing - Client driven
- Stress Testing

Features to be tested

- Basic gesture commands (Play, Stop, Next Track, Last Track, Volume up, Volume down)
- Voice commands (Mute, Track search by song name &| artist name (and possibly sending track over social media component as listed in the 'Could' section of product requirements specification.), Play Specific song, Play specific album)
- Custom Gesture recording

Assumptions

- Users will have a proficiency in using the Spotify application.
- Users will have a Spotify account to be used with the application which will be linked to a social media account (Facebook/Spotify etc).
- Users will have a steady internet connection for streaming.

Approaches

- Conformance testing (Features work as expected)
- Fault-driven testing (Attempt to break functionality)

Methods for test case generation

- Black box (System testing - functionality)
- White box (Unit testing)

Documentation of tests

- Test number
- Unit/requirement being tested
- Purpose
- Test data (pre-conditioned)
- What to test (steps in detail - can re-run)
- Expected results
- Actual results
- Pass/Fail?
- Screenshots/proof

Project Plan

1. Implement gesture recognition system.
2. Implement voice commands.
3. Link gestures to commands.

Risk Management

The main risks associated with the product will involve the physical gestures performed by the users. Users must be aware of their surroundings and use the system appropriately (e.g. ensuring they have enough space to do the gestures and that there are no small children around who could get hurt).

Any social media integration could introduce common risks associated with use of such a system and users should be of the required age to use any of the available platforms.

Professionalism - Group Dynamics

- The group will split the work evenly between itself.
- All group members will attend the full 4 hour session on Tuesday afternoon
- The group will use git for version control and will share the code using an online repository
- The group will make use of online issue tracking.

Ethical Considerations

The ethical implications of the underlying service provided by Spotify are widely considered. These issues commonly involve the inclusion of Digital Rights Management (DRM) and the compensation of the artists and content creators. However, as this software will act purely as an interface, the duty to uphold any DRM responsibilities falls on Spotify themselves.