PYfocals

Design Specification Document

Tim Fanelle, Christopher Hufham, Patrick Kenny, and Jaime Lujan

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Scope

System Objectives

The objective for this software is to track facial movements of the user and give output as virtual keystrokes. More in-depth descriptions on its behavior can be found in the previous documents.

Design Constraints/limitations

The way the software is implemented calls for constraints when it comes to the user's face. Every user will have different facial features and structures and predicting this will be a challenge. For testing, the limitation is that we will only have a certain pool of users that we get to test the software on. This means if someone has very particular facial features, the software could have bugs when trying to keep up with their facial movements.

Data Design

Global Data

- **State:** Current state of the software
- **pState:** Previous state of the software
- **sys_state:** Dictionary that relates system state to function performed

File and Data Cross Reference

- **cf_start():** Begins key configuration on click
- **on_clickon():** Turn on action recognition
- **on_clickoff():** Turn off action recognition

External Data

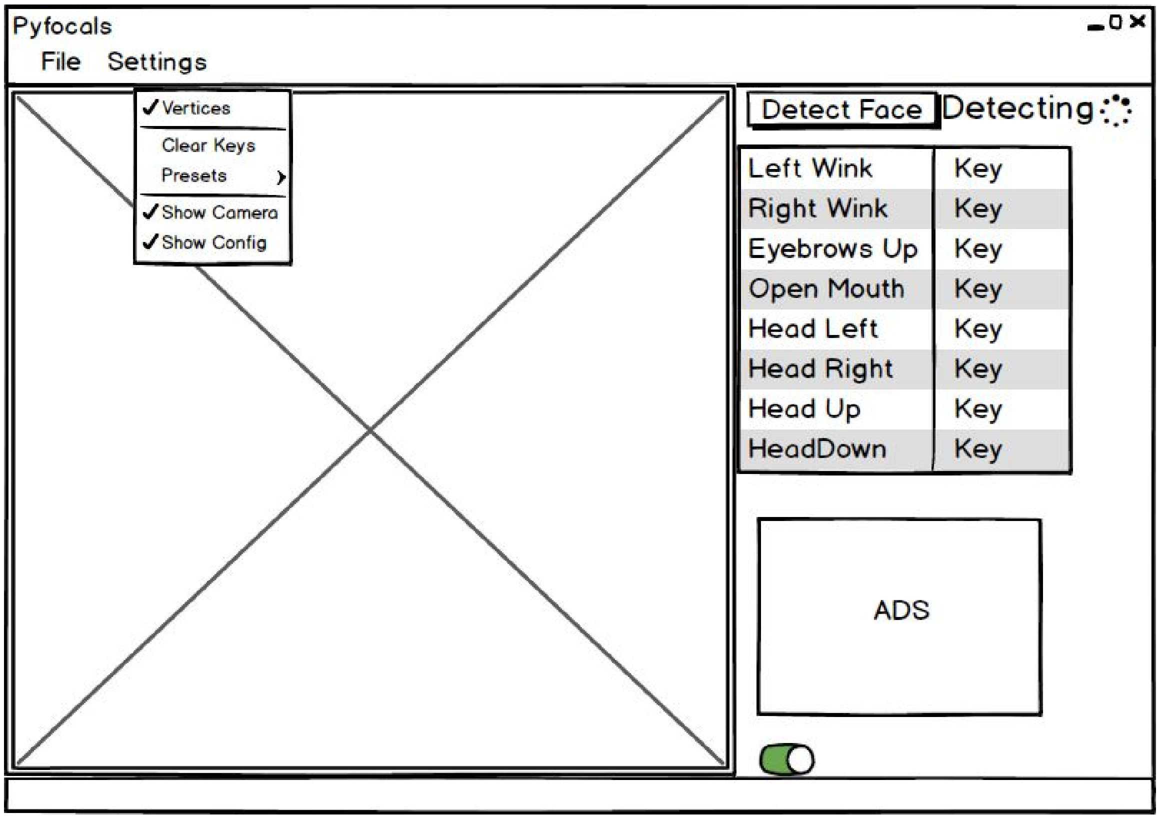
The user may save or load key bindings through external json files. The files themselves consist of a single dictionary. The keys of the dictionary are the string names of the facial inputs recognized by the software. The values of the dictionary are the string corresponding to the keystroke the user has bound to the action. The saving and loading process will be controlled by the built-in json library in python.

Interface Design

Interfaces to External Data

The File tab in the menu bar will have sub tabs for saving custom made configurations and loading them. This will open a file selection window from the OS opening in the key bindings directory for Pyfocals. The user can then save their current bindings as a new json file or load a previously saved one (depending on option selected). Saving will generate the json file in the selected directory. Loading will overwrite the current key dictionary and update the buttons on the main window.

Graphical User Interface



Left Wink	Key
Right Wink	Key
Eyebrows Up	Key
Open Mouth	Key
Head Left	Key
Head Right	Key
Head Up	Key
HeadDown	Key

The user interface is divided into two main sections, left and right. The large square on the left side is devoted to the user's webcam output. This is shown so that the user will understand how the software is reading their face. The user may activate a setting to draw the vertices on their face if they wish. The right side is the more complex of the two. Going from top to bottom there is; Face detection indicator, binding table, adspace, and tracking toggler. The face detection indicator at the top will let the user know if the software can currently detect a face from the webcam input. The binding table is where the user can see the facial inputs they can bind keys to. When the user clicks on an entry in the table, the software will prompt them to press a key. The next key pressed will be registered into the table, and will act as the bound key for the selected input. The adspace can be used in future versions to make the software more profitable (or will be replaced entirely if we can figure out something better to put there.) The last element is the tracking toggler. This button allows the user to toggle whether the software is currently tracking.

Interfaces to External Systems or Devices

Pyfocals will require access to a camera/webcam that is attached to the user’s machine in order to detect facial movements. This will be accomplished by utilizing a built-in object in openCV called VideoCapture.

Comments/restrictions/limitations

The software is written almost entirely procedurally so the software will seem to act as one single, large function that is repeated while the software is running. Since the software is written procedurally there is a limitation as to the order actions can follow as well as limitations when it comes to adjusting to actions trying to be taken outside of their prescribed time.