Visual Snow Syndrome Project

Aim:

For characterizing the level of symptoms of VSS

Goal:

Develop a computer program in python to generate white noise superimposed upon a Snellen eye chart. The noise must be adjustable for brightness, blur.

Noise- Salt and Pepper Noise:

- Uniform (Added noise)
- Noise multiplied by image
- Noise (Tried it, not very good results)

Language used- Python, xml, QML

IDE it was developed on- Pycharm IDE

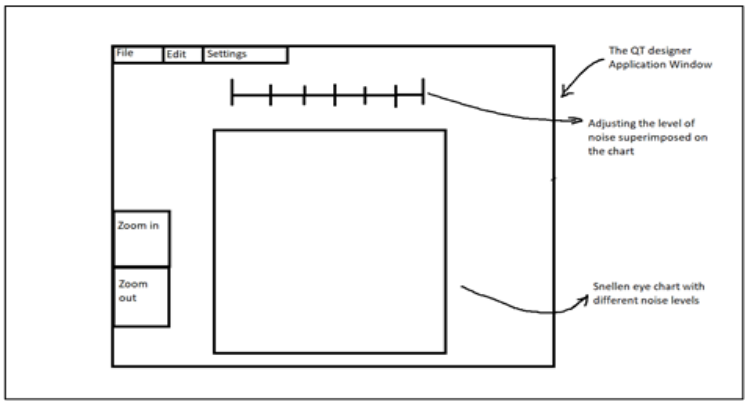
GUI- PyQT5

- Don't have to code separately for Linux, windows

Further work:

1. Adding the backend functionalities to the GUI
2. Planning how the UI is supposed to look

Original Plan of the UI:



Documentation for VSS Project:

1. Created a virtual environment using Pycharm:
    - Have not inherited global site packages
    - Base interpreter is Python 3.8 newly created for this project

2. Packages installed using pip:
    - Numpy
    - PyQT5
    - Pyqt5-tools

    (This is the one that gives access to QtDesigner but refer under qtquick.py for further info)
    - Scikit-image
    - Matplotlib
    - OpenCV-python

3. Did pip freeze > requirements.txt

This is so that it is useful for everyone who is trying to develop.

QML QtQuick

4. Installed QML editor package for PyCharm using the IntelliJ marketspace. This is so that qt quick can be run on PyCharm only and don't need qt creator IDE. Has only 30 day free period though will have to see what to do after that. If we decide to use QtQuick, maybe we can switch the **IDE to Qt Creator** because it's made for this purpose.

5. Installed Qt Creator 4.15.2 (Community) to implement QtQuick as PyCharm's QML editor has a limited 30-day free period. During the installation, selected the Qt 6.1.2 version for installation. As Mingw64 is a compiler for C++, it is not essential for installation as of now. Qt Creator will be used for editing and designing the GUI.

6. Pycharm used for the scripts and Qt Creator is used for visualization and the QML files. However, the final QML files are run through the “qtquick.py” script on PyCharm.

QtWidgets XML

7. QtDesigner was used for creating the layouts. Had to link PyUIC5 and qt designer with the external tools in PyCharm.

8. Converted the UI files (xml) generated by QT designer to python using PyUIC5 tool.

9. Python was then used with PyQT5 on the converted UI files for the signals and slots connections.

File Organization Structure:

MAIN PROJECT DIRECTORY: VSS

Folders:

- images
  Contents:
  - eye_chart.png
  - test_image.jpg

- UI
  Contents:
  - Darkeum.qss
  - horizontal.py – This has a horizontal layout for the sliders that we had tested out
  - vertical_blur.py
  - MainWindow.ui (This can be opened with QtDesigner)

Txt file:

- requirements.txt file

This is useful later for those who are downloading the source code, just have to run this file. Instructions for that below.

Extra python files-

1. noise.py

Main file with the levels of Gaussian noise. Contains different combinations of noise. As of now, additive noise is preferred. Could optimize this file, that's yet to be done (Ex: create various functions for addition, multiplication, different multiplication of noise to the image and then add the plot command inside the python function as well).

2. other_types_noise.py

Uses the scikit-image library (imported as skimage in python) to mimic the different types of noise that could be used. List of all the noises experimented with:

a. localvar
b. poisson
c. gaussian (normal white noise)
d. salt and pepper
e. salt
f. pepper
g. speckle

From what I read up, QtWidgets for desktop application and QtQuick for mobile, etc. But now the functionalities for QtQuick have improved so it's used now for desktop applications as well. QtQuick definitely easier to use than QtWidgets even though QtWidgets has QtDesigner support. For now, both the files are there in the folder, but once we choose exactly what we are going for, we can delete the redundant one.

To Run for those not coding:

pip3 install -r requirements.txt

This is why we added brightness and blur:

“The condition is often visible in all light conditions, although it is more noticeable under certain light and against backgrounds that are darker. Dim lighting can exacerbate it as can darkness. Some patients report it being particularly bothersome when they are trying to read.”