Introduction to Programming II Project Log.

Project title: Music Visualisation
Topic: Lesson 7.2 Extending the apps.

1. **Progress in this topic.**
    a. I developed a MIDI keyboard in the project.
        i. It plays some notes range from C4 to D5, using the mid keys in the keyboard (A - L)
    b. The visualisation for this topic (Fireworks), was implemented.
    c. I started with a new visualisation.
        i. The new visualisation would be a circle drawn from vectors, that increases and decreases according to the music analysis.
    d. Some refactoring of the code was made, keeping the controls in a folder and a new folder for utilities.
2. **Problems faced and solutions.**
    a. I encountered some bugs in my code, that changes font colour and size due to the new Controls.
        i. The solution for this was to use the p5 push and pop functions in order to save and exit a drawing state.
    b. I encountered some mistakes when implementing the Fireworks visualisation in my code.
        i. This mainly was due to the structure differences of my project and the lesson code.
            1. E.g. My project uses a class structure, while the lessons use constructor functions.
        ii. To overcome this, I had to do some debugging. The main problem was the use of the keyword “this” in the classes.
    c. The MIDI keyboard implementation was pretty straightforward, thanks to the p5 documentation and examples.
    d. For the new visualisation I have to think and go over some maths to calculate the vector point in the circle.
        i. I believe this will be overcome using some trigonometry.
3. **Plans over the next few weeks.**
    a. The MIDI Keyboard development was planned for a 2 weeks span, as I could shortened the development time, I would focus to create 2 new visualisations:
        i. I will finish the Circle visualisation.
        ii. I will think of another visualisation to extend the app.
    b. After that 2 weeks, I would start with the development of a new feature for sound effects using the keyboard or a virtual pad.
        i. I’m 50% confident that this development would start sooner than 2 weeks.

Introduction to Programming II Project Log.

Project title: Music Visualisation
Topic: Lesson 8.4 Debugging Skills

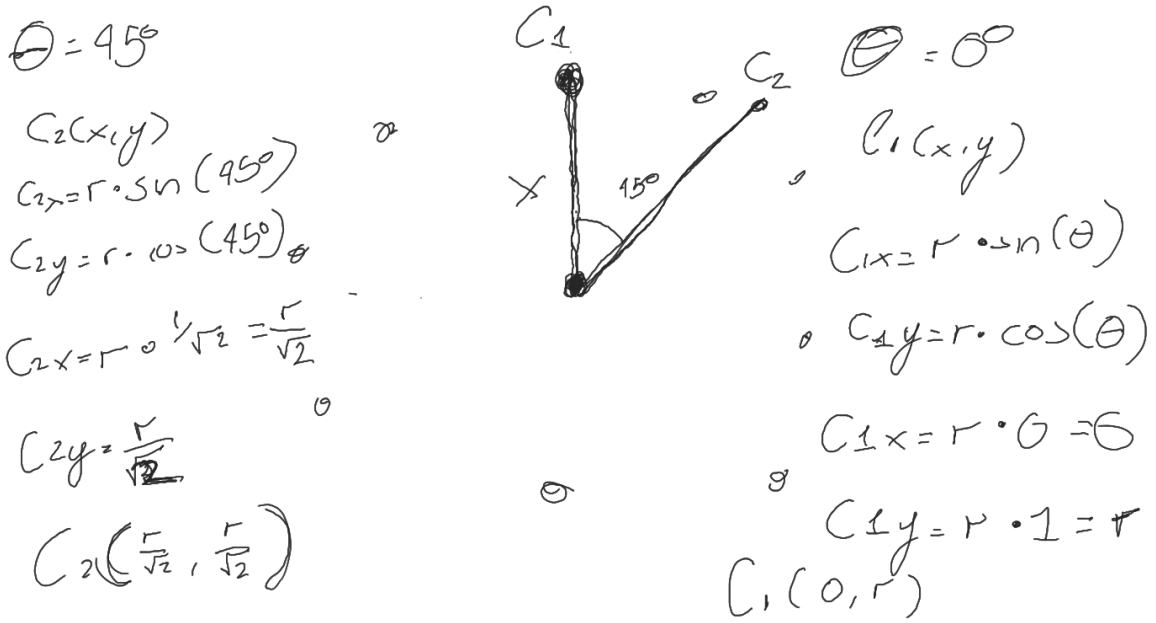
1. **Progress in this topic.**
    a. The visualisation for the circle visualisation was fully implemented.
        i. This circle is drawn from vectors that increase and decrease according to the music analysis.
        ii. Some mathematical analysis was made that took me longer than expected. *See figure 1.*
        iii. However, when implementing the code, I found out that the mathematics was already implemented in the Firework visualisation.
    b. I started with the development of the Effects Pad.
    c. I have lost some of the time advantage I had reported in the Project Log of the academic week 14.
        i. I've planned to use that time advantage to work and implement a new visualisation, but this could not be done.
2. **Problems faced and solutions.**
    a. I could not implement change of colour along the vertex in p5.js
        i. An idea of the visualisation was to create different colour lines that were rotating along the circle.
        ii. However, in the Github repository, an issue was opened indicating that it is not possible to change colours for each vertex stroke in the figures.
        iii. The response of a p5.js developer was the following:
            1. *"thanks for reporting. this is tracked here. currently we don't support per vertex coloring in p5.js."*
            2. See link to the issue here.
        iv. I'm thinking that I could:
            1. Use the functions beginShape() and endShape() several times inside the for loop while keeping the reference of the angle I'm drawing.
                a. This would create several shapes that would be seen as a single circle.
            2. However, I'm very happy with the resulting visualisation and I've lost some days of advantage I had in the previous weeks.
                a. If at the end there is some time of advantage, I would try this idea.
    b. The effects pad is not behaving as expected.
        i. I have implemented the effects pad first effect with p5.Delay and it works correctly with the sound loaded in the preload.
            1. When a new sound is loaded in the draw function, the delay effect is not working as expected.

ii. When calling other effects, like p5.Reverb, the effects have a different behaviour that the p5.Delay.
    1. This was unexpected, since all effects classes, like p5.Delay and p5.Reverb are extending the class p5.Effect.
iii. A solution has to be implemented in the academic week 17.
    1. This would involve some investigation of the p5.Effect implementation and its interaction with the sound channels.

3. Plans over the next few weeks.

a. Holidays.
    i. I would be out of office for the whole academic week 18.
b. Finish the Effects Pad.
    i. The plan is to finish by the start of the academic week 18.
c. Finish a new visualisation.
    i. I would start working on this visualisation in the academic week 19, and the plan is to finish in that same week.

Figure 1.



Introduction to Programming II Project Log.

Project title: Music Visualisation
Topic: Lesson 9.3 Beyond console.log

1. **Progress in this topic.**
    a. I've completed the implementation of the Effects Pad.
        i. This feature is not fully behaving as expected, however, I decided to move on and release as is, as I was employing much more time than expected.
            1. I started its development on the 21st of july and finished on the 13th of august.
            2. The plan was to finish the Effect Pad in 2 weeks time.
                a. Considering the 1 - 5 august out of office, I should have finished this feature at most on 9th august at most.
    b. I've completed the implementation of the new Sandstorm visualisation.
        i. This is a new visualisation that uses the factory pattern.
        ii. Sand particles come out from the screen from top to bottom at a random speed, and interact with the amplitude value to alter its x position on the screen.
2. **Problems faced and solutions.**
    a. The delay effect was not behaving as expected, when there was a change in the sound file, the effect did not take place.
        i. I've found out that this was due to how the class is implemented in the program.
            1. When the program starts the Effects Pad class is instantiated with the default sound file of the program.
                a. This creates an Effects array that is instantiated with that default sound file.
            2. When the sound file changes, the Effects does not change the sound file origin, hence could not apply the sound effect on the new sound file.
        ii. To overcome this, I created a function that whenever there is a change on the sound file, a new Effects array is instantiated with the new sound file.
            1. This solution worked well for the Delay effect.
    b. The Reverb effect is not applying as the Delay effect.
        i. This problem was not expected, as I stated on the last project log, both classes p5.Delay and p5.Reverb are extended from the p5.Effect class.
        ii. The reverb is applied once to the sound effect, but seems to have no effect on unattached from the sound file.
        iii. I could not come to a solution for this problem.
    c. The sandstorm visualisation was implemented in a short period of time.

i. To overcome the delay of time I had (approximately a week) I decided to develop this new visualisation as fast as I could.
ii. There was not much challenge on this visualisation.
    1. A factory pattern was implemented correctly.
iii. The one challenge was in the creation of many Sand particles that were on the screen at a time, and seemed to occupy a lot of the call stack.
    1. With this, I could not apply a y-axis transformation on the visualisation.
        a. I wanted to apply a change of speed of the fall of the sand according to the fourier analysis.
        b. However this would imply a quadratic time complexity function on a Sand update.
    2. I overcome this, with a limit on the creation of Sand particles.
        a. If the current Sand particles on screen are above 1000, the function to update the Sand particles is returned.

3. Plans over the next few weeks.

a. Perform testing.
    i. I plan to perform a test over the last feature and visualisation.
        1. These are both the Effects Pad and the Sandstorm visualisation.
b. Perform Usability testing.
    i. I plan to arrange some user tests.
        1. I would put the steps I want the user to reproduce on the whole application.
        2. I would record the interaction of the users with the application.
        3. I would make a report.
c. Sandstorm visualisation backwards.
    i. I want to implement a function that, when the user checks or presses a button, the visualisation goes from bottom to top, instead of top to bottom.

Introduction to Programming II Project Log.

Project title: Music Visualisation
Topic: Lesson 10.3 Finishing touches.

1. **Progress in this topic.**
    a. I performed testing on the last both feature and visualisation.
        i. This test can be viewed in the test folder on the file “Sandstorm and Effects Pad testing”.
    b. I performed usability testing with 2 different users.
        i. These tests can also be viewed in the test folder.
    c. I implement the feature of the Sandstorm visualisation going backwards and forwards with a “Reverse” button.
    d. I addressed some bugs found on the “Sandstorm and Effects Pad testing”.
        i. I corrected the problem that seems the visualisation perform slow.
        ii. I corrected some colouring problems when the user enter the Ridge Plot visualisation, caused by the lack of push() and pop() functions in the draw function.
        iii. I decided to take out the Reverb effect on the Effects Pad as it was not performing correctly.
2. **Problems faced and solutions.**
    a. The bug of the Sandstorm visualisation seemed the visualisation to perform slow.
        i. At first, I thought that this was caused to the high number of particles that the visualisation required at a specific time.
        ii. However, I found out that the problem was in my code:
            1. When the particle list passes some threshold, I returned the function, but I never update the particles.
                a. I implement this with the idea that the visualisation would perform poorly with a lot of particles in it.
            2. This caused that, at some time, the x-axis of the particles was updated (when the threshold was not passed) and at some time the x-axis was not updated.
            3. Once the bug was found, it was simple to correct.
    b. The bug on the Effects Pad.
        i. The colouring effect bug was addressed by looking at the code and assure all drawing functions perform a push() and pop() state.
            1. These functions are especially important to not carry a drawing state to another entity.
        ii. I could not address the bug that the Reverb effect was not behaving as expected.
            1. The p5.js documentation is not clear about how to make de desired behaviour.
                a. Basically, I want the effect to behave the same way as the Delay effect:

        i. When the user clicks and holds a button the effect starts, and it remains until the user stops pressing the button.
    b. Both classes, Delay and Reverb, extend the p5.Effect object, so I thought this would be straightforward.
2. As it was a problem I was facing for a couple of weeks now, I decided to leave the Reverb Effect out of the final deliverable.
    a. The Effects Pad would only contain the Delay Effect, which I could implement correctly.

3. Plans over the next few weeks.

a. Final tweaks to address:
    i. Address the lack of “loading” text while uploading a sound file.
        1. I believe is a bad implementation of the whileLoading function callback in the loadSound() p5 function.
        2. But, of course, as I am using the loadSound() function in more places than the preload (as is expected) I can encounter these not desired behaviors.
    ii. Increase the particle threshold in the Sandstorm visualisation.
        1. As I catch that the “performance” problem was not in the number of particles, I can increase the threshold of particles.
            a. I quote performance because, as I stated, It was a problem in my code.
    iii. Add helper text for the user to interact with the MIDI keyboard and the Effects Pad.
        1. As I learned from the usability testing, these features are not so obvious for the user to interact with.
        2. The MIDI keyboard is practically hidden, the user could only access it if someone else tells him to do so, or if he accidentally presses any key from a to l.
    iv. Optional: Hide some controls when the user enters fullscreen.
        1. I am not sure if I would have the time to implement this feature, but it would be a nice thing to add.
        2. The controls cover a lot of the screen, and the visualisations tend to hide behind the controls.
        3. The idea is, that if the user is in full-screen mode, some or all of the controls are hidden for the user to watch the whole visualisation.
b. Prepare the report.
    i. Organize the files and folders of the deliverable.
    ii. Comment on the code and ensure it is clean and readable.