Proposal: Generating Original music from user-created melodies.

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Project Background

In recent years, there has been a notable surge in the application of AI-Driven productivity tools to enhance user creativity and productivity. Many of these tools enable users to augment their digital content with AI-Generated elements, Adobe's generative expand tool in photoshop being a prominent example. [1]

Figure 1: Examples of Content Expansion

The recent trend has sparked my curiosity and led to a question: Can this concept be applied to music production? It seems that researchers have the same question and have created research initiatives and projects with this aim. Google's generative music research project 'Magenta Studio' stands as an interesting and noteworthy example, with specific focus on providing AI tools to the widely used Ableton music production software in the form of a plugin. [2]

Magenta's 'continue' tool directly addresses the question I've posed, allowing users to generate music that seamlessly follows user-provided melodies within a chosen track.

Objectives

The general aim of this project is to develop a similar online musical tool akin to magenta's 'continue' tool, allowing the generation of 'original' music based on a user-provided melody.

Specifically, the project will investigate the following primary, extension and fallback objectives:

Primary objectives

1. Research and evaluate existing work in the field of AI Music generation to gather an idea of currently existing technologies.
2. Identify Successes and Failures of existing AI Music tools in professional software, research studies and online toys.
3. Design and plan the tool's frontend using the insights gained from Objectives 1 & 2.
4. Explore the effectiveness of various backend implementations through prototyping.

5. Conduct qualitative and quantitative assessment to determine how successful the tool is. (As it stands, I would like the tool to create melodies which are indistinguishable from human made melodies. This may be subject to change).
6. Reflect on the successes and challenges encountered during the project.

Extension Objectives

1. Modify the tool to generate music around the user's melody, rather than creating a separate track.
2. Enhance the tool to provide multiple melodies, giving users the option to select from a variety of generated tracks.
3. Enable users to export their generated melodies as MIDI files for importation into music production software.

Fallback Objectives

1. Create a web-based tool for users to create short MIDI melodies.

Relevance

This project's significance lies in its potential to aid music creation, empowering users to generate original compositions from their own melodies with the assistance of AI technology.

The objectives I've outlined above will serve a dual purpose to drive the development of my tool while also providing an opportunity for me to assess and enhance my existing technical skills and learn new languages and frameworks and parts of computing which are currently a mystery to me.

I currently have technical experience with machine learning libraries using Python from my modules in prior years and slight UI design experience from personal projects, with no experience creating web content.

As it stands, these skills alone will not allow me to complete this project. I anticipate that I will need to learn the following skills and technologies to be able to fulfil my primary and extension objectives:

- Proficiency in HTML, CSS and JavaScript for the Tool's frontend.
- Familiarity with a framework for integrating the frontend with A python backend (Django seems like an attractive option).
- Website Design.
- Website Hosting.
- Fundamental knowledge of music theory.

Resources Required

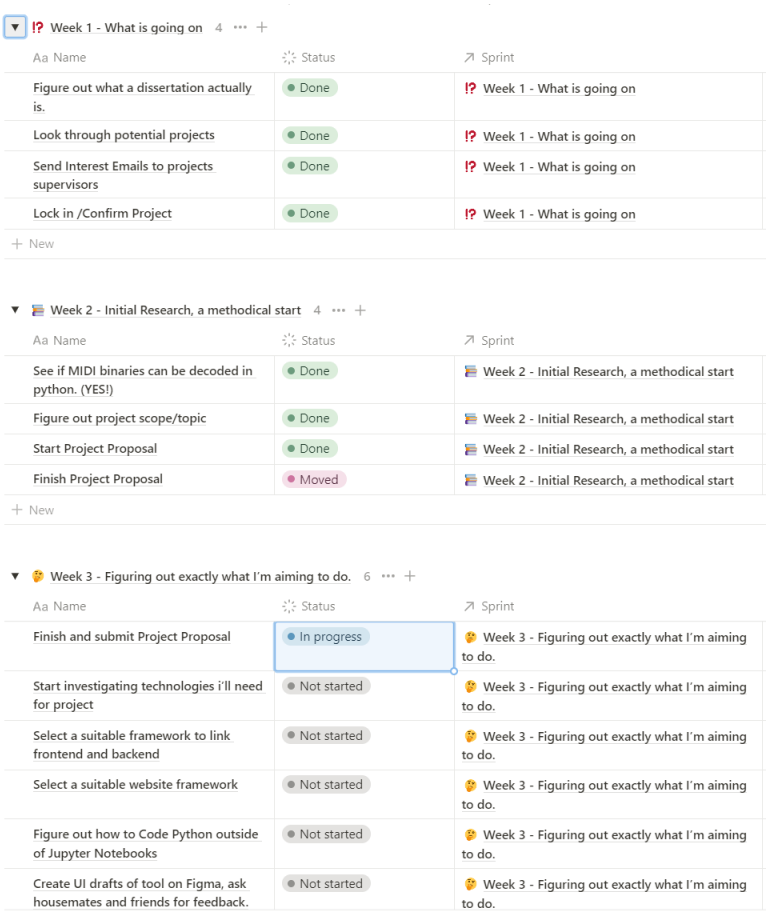
This project may involve reserving study or meeting rooms for conducting user testing on an as-needed basis.

Although I currently lack experience in web hosting, I anticipate the need for some sort of online hosting resource to make my tool available on the web. I plan to specify the necessary resources once I research the hosting strategy for my tool.

Planning

I've created a notion workspace to facilitate my project's planning process, as I've found it to be an extremely helpful tool for organisation in a prior project (Software engineering Group 4's documentation).

My intention is to maintain this notion workspace, using it as a central hub for monitoring my background research, references, project timeline, weekly work updates and keeping track of supervisor meetings. Below is a screenshot of one part of my workspace, the current task list, which shows my week-by-week tasks.



!? Week 1 - What is going on 4

Aa Name	Status	Sprint
Figure out what a dissertation actually is.	Done	!? Week 1 - What is going on
Look through potential projects	Done	!? Week 1 - What is going on
Send Interest Emails to projects supervisors	Done	!? Week 1 - What is going on
Lock in /Confirm Project	Done	!? Week 1 - What is going on

+ New

Week 2 - Initial Research, a methodical start 4

Aa Name	Status	Sprint
See if MIDI binaries can be decoded in python. (YES!)	Done	Week 2 - Initial Research, a methodical start
Figure out project scope/topic	Done	Week 2 - Initial Research, a methodical start
Start Project Proposal	Done	Week 2 - Initial Research, a methodical start
Finish Project Proposal	Moved	Week 2 - Initial Research, a methodical start

+ New

🤔 Week 3 - Figuring out exactly what I'm aiming to do. 6

Aa Name	Status	Sprint
Finish and submit Project Proposal	In progress	🤔 Week 3 - Figuring out exactly what I'm aiming to do.
Start investigating technologies i'll need for project	Not started	🤔 Week 3 - Figuring out exactly what I'm aiming to do.
Select a suitable framework to link frontend and backend	Not started	🤔 Week 3 - Figuring out exactly what I'm aiming to do.
Select a suitable website framework	Not started	🤔 Week 3 - Figuring out exactly what I'm aiming to do.
Figure out how to Code Python outside of Jupyter Notebooks	Not started	🤔 Week 3 - Figuring out exactly what I'm aiming to do.
Create UI drafts of tool on Figma, ask housemates and friends for feedback.	Not started	🤔 Week 3 - Figuring out exactly what I'm aiming to do.

Figure 2: A Screenshot of the Tasks from weeks 1-3 of my notion workspace.

I currently do not have an overarching plan for the whole year. I would like to discuss this in a meeting to get an idea of how long each stage of a project like this would take.

Availability

Below is my calendar's typical weekday plan. Each day is subject to change and may differ slightly from how I have planned it. My timetable will of course change between terms.

My work shifts are consistently on Monday, Tuesday and weekends. I've made it clear to my work about my academic commitments and will not hesitate to quit if my job interferes too much with my studies.

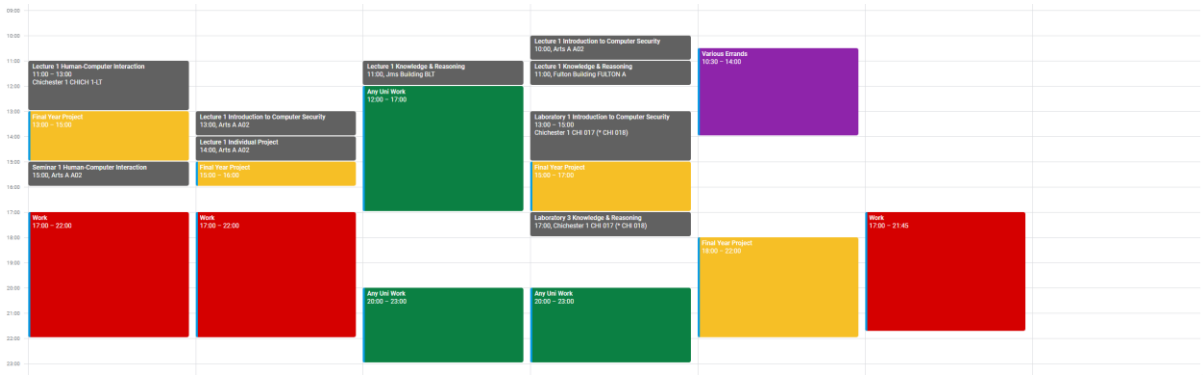


Figure 3: Calendar Availability

I am available for meetings at any time I'm not in a lecture or at work.

Works Cited

[1] Clark, P. (2023, 07 27). *Photoshop releases new Generative Expand workflow and global language support for Firefly-powered features*. Retrieved from Adobe Blog: https://blog.adobe.com/en/publish/2023/07/27/photoshop-releases-new-generative-expand-workflow-global-language-support-for-firefly-powered-features

[2] Roberts, A. E. (2019). *Magenta studio: Augmenting creativity with deep learning in ableton live.* research.google.