Guitar Tablature Transcription for MIDI

John Pederson

registration: 100266127

1 Project description

The aim for this project is to create a program which, when given an MIDI file input, will produce accurate guitar tablature for the file's contents. This project is of particular interest to me both because of my background as a guitarist and my interest in the algorithms themselves.

As a guitarist, creating tablature is an interesting subject which, in time, I hope to expand beyond the bounds of this project with a form of automated tablature generation. I also believe that this project will help me improve as a musician by improving my knowledge of the fretboard.

Selecting the correct position on the fretboard for each note to ensure the tablature is playable will be the major problem for this project. Writing an algorithm that decides where each note should be played is a significant challenge, but I am very interested in exploring the different possible solutions, with a focus on machine learning.

2 Resources and reference material

After studying the topic I have found a few relevant pieces of literature, and some resources that will be invaluable for this project.

Firstly, the data set discussed in de Valk et al. (2019) contains a large amount of lute compositions in both tab and MIDI format. This will be useful for testing my transcriber as I will be able to directly compare the tablature created from the MIDI file in the data set with the corresponding tablature within the data set. Evidently the lute is not a perfect analogue to the guitar, however, the basic system used for the transcription should be sufficiently similar between the two instruments as to be functionally the same with a small amount of changes.

The software TAB is a pre-made piece of software for printing tablature out based on input (Williams (2006) has a useful manual for working with TAB). Using this will allow me to focus on the problem of finding playable tablature for the notes in the MIDI file rather than the actual method of printing it to a sheet.

Tuohy and Potter (2005), Wiggins and Kim (2019) and Kehling et al. (2014) all discuss different solutions for automating tablature transcription. Tuohy and Potter (2005) and Wiggins and Kim (2019) focus on machine learning methods, while Kehling et al. (2014) uses a more bespoke method.

3 Development approach

There are multiple different possible approaches for this project. I will be attempting to create a machine learning algorithm which can be trained and tested using the de Valk

et al. (2019) data set.The algorithm will compare the pre-rendered tablature from the data set with the tablature generated by the transcriber in order to define how 'good' the transcription is.

4 Risks

The most probable issue that may arise would be that the algorithm may require more data or time than I have available to be trained to an acceptable level of accuracy. This is why an early prototype is important, so that if the training looks to be taking an inordinate amount of time then I will be able to switch focus and either use a different machine learning method or, worst case, create a bespoke algorithm for the transcription.

There is also a possibility that there may be issues working with TAB, if this is the case I may have t allocate some of my time to creating a method for printing out the tablature. This is something that I will identify early on and rearrange my project plan if necessary.

5 Project plan

The full project plan, including producing this proposal, can be seen in the Gantt chart in figure 1. As part of this proposal I have already begun to study the literature pertinent to this project. After studying the literature I will go on to design a prototype program which has at least base level functionality, which I hope to have completed by week 12. Once I have some functional code I will be able to start testing the software, and will continue routinely testing the build for the remainder of the development. As the progress report is due in week 12, I will begin writing for it in week 10, and hope to be able to report a fully functional prototype.

After a 2 week break for Christmas I will then start working on coding the final product. This will be an iterative process, building on the prototype and slowing increasing and improving functionality, testing regularly. The final build will hopefully be complete by spring week 8, leaving a full month for the final report writing. The final report will build on documentation from the progress report and that I will update throughout the development. Once the portfolio submission in week 12 is complete I will then focus on preparing for the inspection.

References

de Valk, R., Ahmed, R., and Crawford, T. (2019). Josquintab: A dataset for content-based computational analysis of music in lute tablature. In *ISMIR*, pages 431–438.

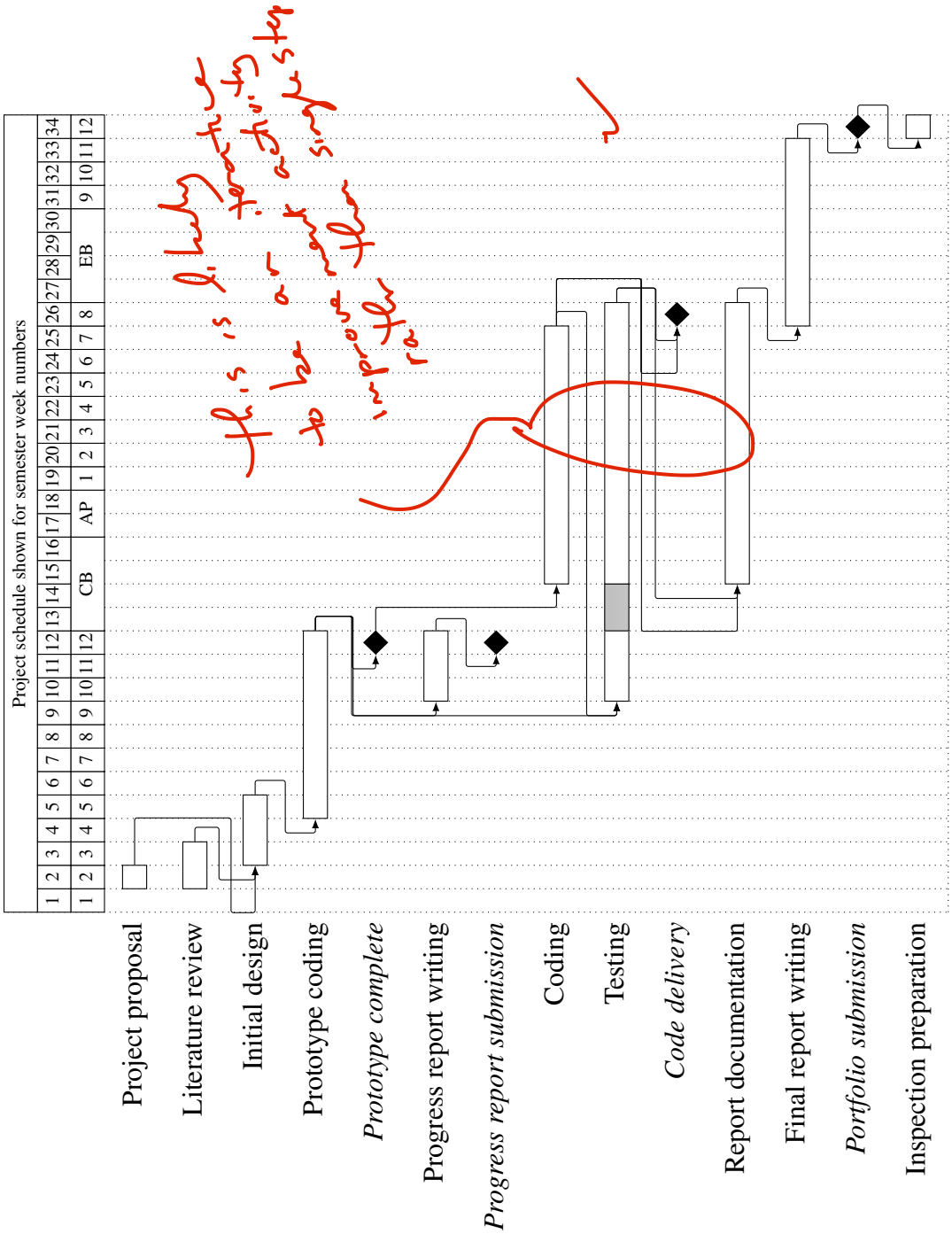

Figure 1: Project Gantt chart

Kehling, C., Abeßer, J., Dittmar, C., and Schuller, G. (2014). Automatic tablature transcription of electric guitar recordings by estimation of score-and instrument-related parameters. In *DAFx*, pages 219–226.

Tuohy, D. R. and Potter, W. D. (2005). A genetic algorithm for the automatic generation of playable guitar tablature. In *ICMC*, pages 499–502.

Wiggins, A. and Kim, Y. E. (2019). Guitar tablature estimation with a convolutional neural network. In *ISMIR*, pages 284–291.

Williams, L. (2006). Tab.

Project proposal

Description of project: aims, motivation, understanding of issues, problems	First	2.1	2.2	3	Fail
Resources, references: evidence of preliminary work to identify key resources, initial reading	First	2.1	2.2	3	Fail
Proposed approaches: relevance, suitability, appropriateness	First	2.1	2.2	3	Fail
Risks: identification, suitable contingency planning	First	2.1	2.2	3	Fail

not really described

Quality of writing

Clarity, structure correctness of writing	First	2.1	2.2	3	Fail
Presentation conforms to style	First	2.1	2.2	3	Fail

Workplan

Measurable objectives : appropriate, realistic, timely	First	2.1	2.2	3	Fail
Gantt chart: legibility, clarity, feasibility of schedule	First	2.1	2.2	3	Fail

Comments

could do with avoiding over use of personal terms to give a more objective view

needs details of how the system will be evaluated.

Supervisor: Gavin Cawley

Markers should circle the appropriate level of performance in each section. Report and evaluation sheet should be collected by the student from the supervisor.