Classification of Traditional Music Pieces Utilising Machine Learning

Musical tradition has always highly differed between different cultures in the world. Whether this difference roots from the use of different instrumentation, the different purposes music has in different parts of the world, or a focus on a particular element of said music; the truth is that traditional music is extremely diverse. For many years, the study of classical and traditional music has mostly focused on the European tradition, but as of recent, this focus has been shifted towards other parts of the world. This project aims to investigate this diversity from a computational point of view: by attempting to find if an AI can gain an understanding of the different musical traditions of different places of origin.

It is difficult to apply a theoretical framework to the disparity in musical traditions across global cultures. By attempting to teach this distinctions to a computer, this experiment allows us to explore the limits of AI when trying to approximate human reasoning and understanding.

The main aim of this project is to develop an AI that, given a previously unseen piece of traditional or classical music, it is able to give an accurate answer on the cultural roots of that piece of music. For this project, given the time and resource constraints, it will be impossible to be comprehensive, and the AI will inevitably have to focus on a narrow selection of cultures.

The first three weeks of the project will be dedicated almost purely to research. Firstly, to find what Machine Learning techniques and libraries could be utilised. Secondly, to closely define which cultures will be explored in the scope of this project and which will be left for potential further research. Thirdly, to create a large enough database of music recordings, which will be training data for the AI to be able to learn to recognise patterns in the musical genres that will be analysed. These three areas of research will all be challenging in its own ways.

Finding suitable Machine Learning techniques will be perhaps the easiest step, but it still will require me to spend substantial time considering my different options and learning about the topic. It will inform me on how to start implementing the final product, and it will enable me to make informed decisions on the specifics of the project.

To choose which cultures will be explored, I will have to first find out about which cultures have a big enough amount of recordings available. This will require me to do an initial search for music, to see what is available.

It will also be hard to define the exact borders of each culture. I will have to find answers to questions such as: Should Europe be considered one unified block, should we distinguish between northern, central and southern Europe, or should we distinguish between countries? What about the different regional scenes of a specific country? Should time period also be considered?

Creating a large database of recordings will also be a challenge. Most music recordings are subject to copyright laws, and I will need to consider how this comes into play when utilising music recordings for my research. Additionally, most world music repositories are behind a paywall, which will make it unfeasible to access them. Hopefully, I will be able to gather a substantial amount of recordings for each of the selected cultures to be studied.

With the beginning of March, the research phase of the project should be concluded, and the implementation will begin. This task is expected to be finished by the end of March. Depending on

the complexity of the method chosen during the research phase of the project, this phase of the project could be more or less complex and time consuming.

Utilising both the knowledge acquired and the database built in the previous phase, an AI will be implemented and trained.
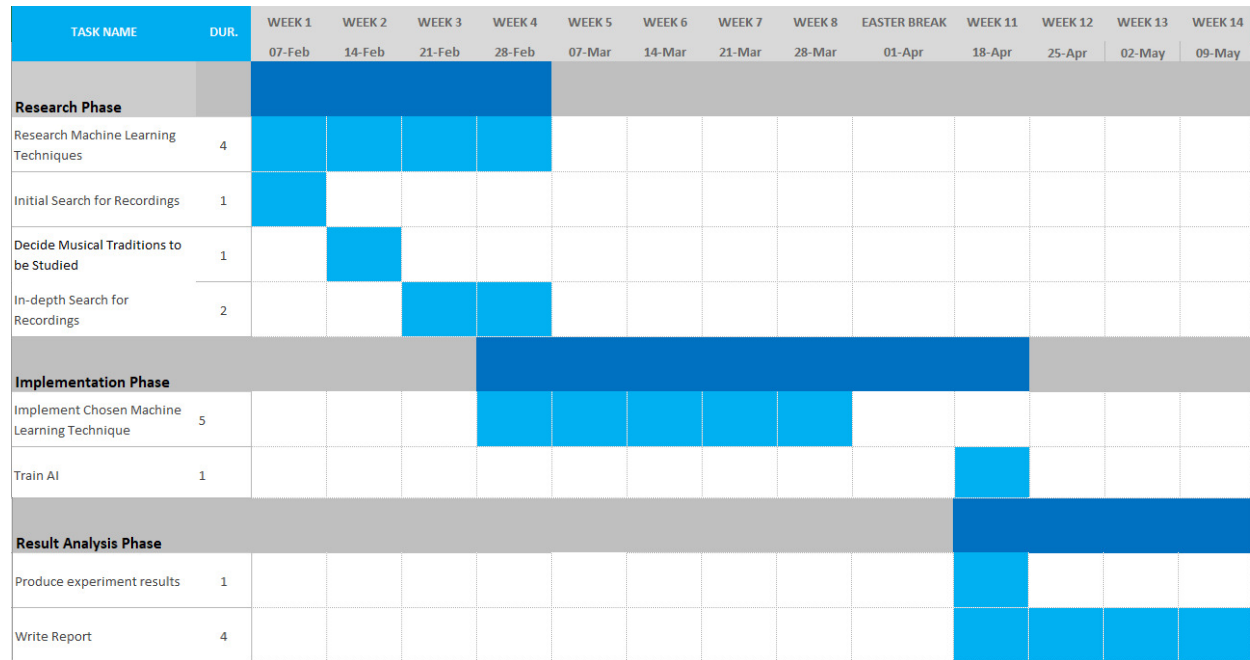
Once the implementation phase is finished, all that is left is the result analysis and the report.

Multiple previously unseen examples of traditional and classical music will be analysed by the AI. The data obtained by these experiments will reveal the accuracy of the built AI. If time allows it, it will also be interesting to test what the AI interprets of some examples of non traditional music. For example, it would be interesting to see if the AI would be able to differentiate between Japanese and Arabic contemporary pop music, having only been trained on traditional music from those cultures.

The report will chronicle the research process: describe the problem I tried to solve, my approach to solve it, the results I got and what further research could be conducted taking into account the results. It will be written on the last weeks of April and the beginning weeks of May, as the project deadline approaches.

Meetings with my supervisor will ideally be held weekly, on Tuesdays or Thursdays. Two special meetings will be organised, one on the last week of February, to assess the conclusions of the conducted research and start planning the implementation; and another on the last week of March, to assess the results of the implementation and decide what to do next, as well as looking into the result analysis and the report writing.

The following Gantt Chart shows the week-by-week plan for this project:

TASK NAME	DUR.	WEEK 1 07-Feb	WEEK 2 14-Feb	WEEK 3 21-Feb	WEEK 4 28-Feb	WEEK 5 07-Mar	WEEK 6 14-Mar	WEEK 7 21-Mar	WEEK 8 28-Mar	EASTER BREAK 01-Apr	WEEK 11 18-Apr	WEEK 12 25-Apr	WEEK 13 02-May	WEEK 14 09-May
Research Phase		■	■	■	■									
Research Machine Learning Techniques	4	■	■	■	■									
Initial Search for Recordings	1	■												
Decide Musical Traditions to be Studied	1		■											
In-depth Search for Recordings	2			■	■									
Implementation Phase						■	■	■	■	■	■			
Implement Chosen Machine Learning Technique	5					■	■	■	■	■				
Train AI	1										■			
Result Analysis Phase											■	■	■	■
Produce experiment results	1										■			
Write Report	4										■	■	■	■

There are several dependencies on this Gantt chart, defined as follows:

To start the "Decide Musical Traditions to be Studied" task, the "Initial Search for Recordings" task must be completed.

To start the "In Depth Search For Recordings" task, the "Decide Musical Traditions to be Studied" task must be completed.

To start the "Implement Chosen Machine Learning Technique" task, the "Research Machine Learning Techniques" task must be completed.

To start the "Train AI" task, both the "Implement Chosen Machine Learning Technique" task and the "In-Depth Search For Recordings" task must be completed.

To start the "Produce Experiment Results" task, the "Train AI" task must be completed.

The task "Write Report" can only be completed if all other tasks are completed, but can be started before the completion of those tasks.

In summary, this project requires research in the area of Machine Learning, the creation of a music database containing music from a set of different cultures, the implementation of an AI that can identify a given recording's culture of origin, and the creation of a report analysing the obtained results.