Requirements Document

TablatureConverter

EECS 2311 – Group 6

Tuan Dau

James Le

Temiloluwa Odunfa

Mohammad Amin Mohammadi

04/20/2021

Table of Contents

1. Introduction

1.1 Purpose of Document

The purpose of this document is to outline the description of the Tablature Converter software, the project's functionality, the technologies being used, some common use cases, and functional requirements that the project must support.

1.2 Background

There are many ways to learn how to play a song using the internet, including following along with video tutorials or finding sheet music online. However, if you are playing guitar, bass or drums, the most common method is to search for tablature represented using text characters.

Tablature, or tab, is a way of writing down an instrument's parts in an accessible manner. In the context of this project, tablature will refer to guitar, bass, and drum tablature. Although tablature is widely used due to its ease of use, most tablature exists in a text-based format. Currently, there does not exist an easy way to turn tablature into a digital file format, such as MusicXML.

Although using text-based tablature is a great way to learn a new song, it cannot be easily transposed, edited, or played back to the user. There are many alternative formats that do not have these issues, but the majority of songs are found as text-based tablatures. The music research community developed a format called MusicXML where it can accurately denote tablature.

1.3 System Purpose

The software product will consist of a desktop application that, upon the upload of a tablature in *.txt format, will detect the instrument that is being described by the uploaded tablature, and convert the tab to a MusicXML file format. The outputted MusicXML file can be opened and used in programs that support the viewing of MusicXML files, such as MuseScore.

2. System Features

2.1 System Features

Users will be able to upload a text file of tablature for conversion to MusicXML. Users will be able to paste their text tab into a textbox for conversion to MusicXML. The application will output a correct MusicXML file from the tablature input. Users will be able to select to save where to store their newly converted files on their local machine.

2.2 User Interfaces

Front-end software: JavaFX

Back-end software: Java, JAXB

2.3 Hardware Interfaces

Windows and Mac operating systems

3. Functional Requirements

3.1 Functionality

1. The application must convert a text file (either uploaded or pasted into the UI's textbox) of guitar, bass, or drum tablature into a MusicXML file.

2. The application must automatically detect which instrument the uploaded tablature is describing.

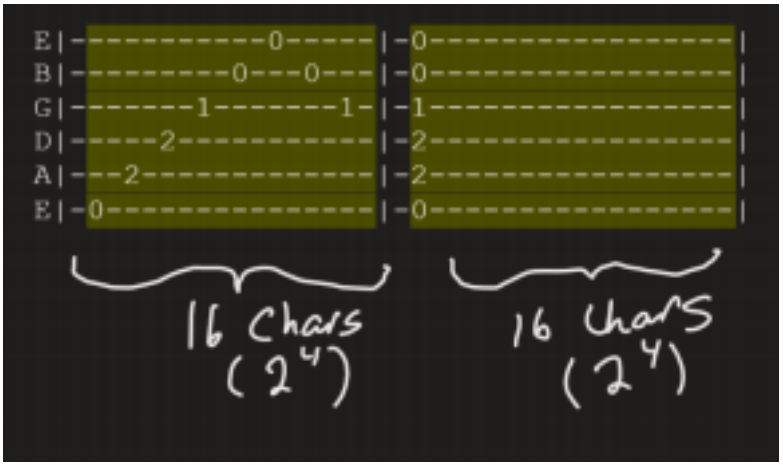
3. The application must always produce an accurate MusicXML file, with the exception of note timings, provided that the tablature input is valid. A valid tablature format is defined below:

- Each line of the tablature starts with a letter indicating the note that the string is tuned to (or for drum tablature, the designated drum kit piece) immediately followed by a lowercase 'L' or vertical bar (|).
- A new measure is defined by vertical lines, indicated by either a lowercase 'L' (l) or with the vertical bar glyph (|). Note that multiple measures are not required for a tab to be converted properly, ie, tabs with one measure will be converted properly.
- All lines in a measure must have the same number of characters.
- If a tab is multiple lines, the strings or drum pieces must be redefined for each new line.

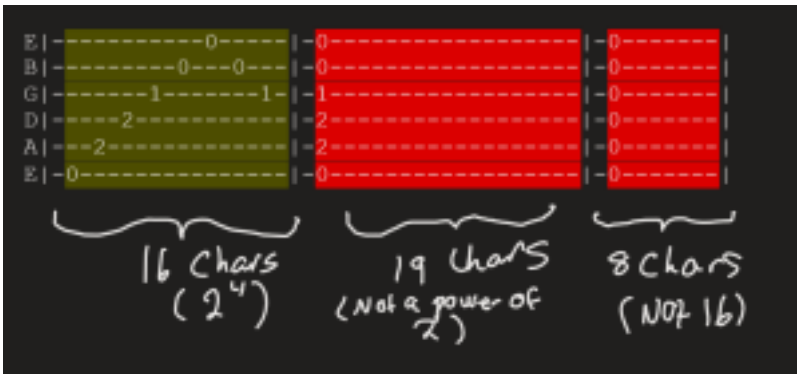
3.1 Functionality – Continued

4. The application must produce appropriate note timings if given a “perfect input file”. A perfect input file is defined as the following:

- All conditions stated in the above Requirement 3) must be satisfied.
- The number of characters in each line from the first note in each measure to the end of the measure must be a power of two. This condition must be consistent for all measures in a tab.
- For example, the following tab is a perfect input file:



- In the case of imperfect inputs, the following tab is an example of an imperfect input file:



3.2 Usability

1. The application must allow users to view the converted MusicXML file format after conversion.

2. The application must allow users to save the MusicXML file to a specified file path after conversion.

3. The application must allow users to upload a tab text file from their machine to upload for conversion.

4. The application must allow users to view and edit the tab text.

4. Non-Functional Requirements

4.1 Performance

1. The application should operate quickly, with a text to MusicXML conversion time of less than 1 second for any humanly playable guitar tab under 5000 lines. Performance is measured once the "Convert" button is clicked, and ends when the MusicXML file is written to the user's computer.

4.2 Usability

1. The application should have an intuitive user interface.

2. The application should only convert single file uploads.

3. The application should be usable on any operating system that supports Gradle and Eclipse.

5. Use Cases

5.1 User Stories

There are a number of different users that we expect to use our application, but the main user group that we expect to see are music students/hobbyists and music teachers. As a result, the Tablature Converter project has been planned around maximizing the satisfaction of those user groups.

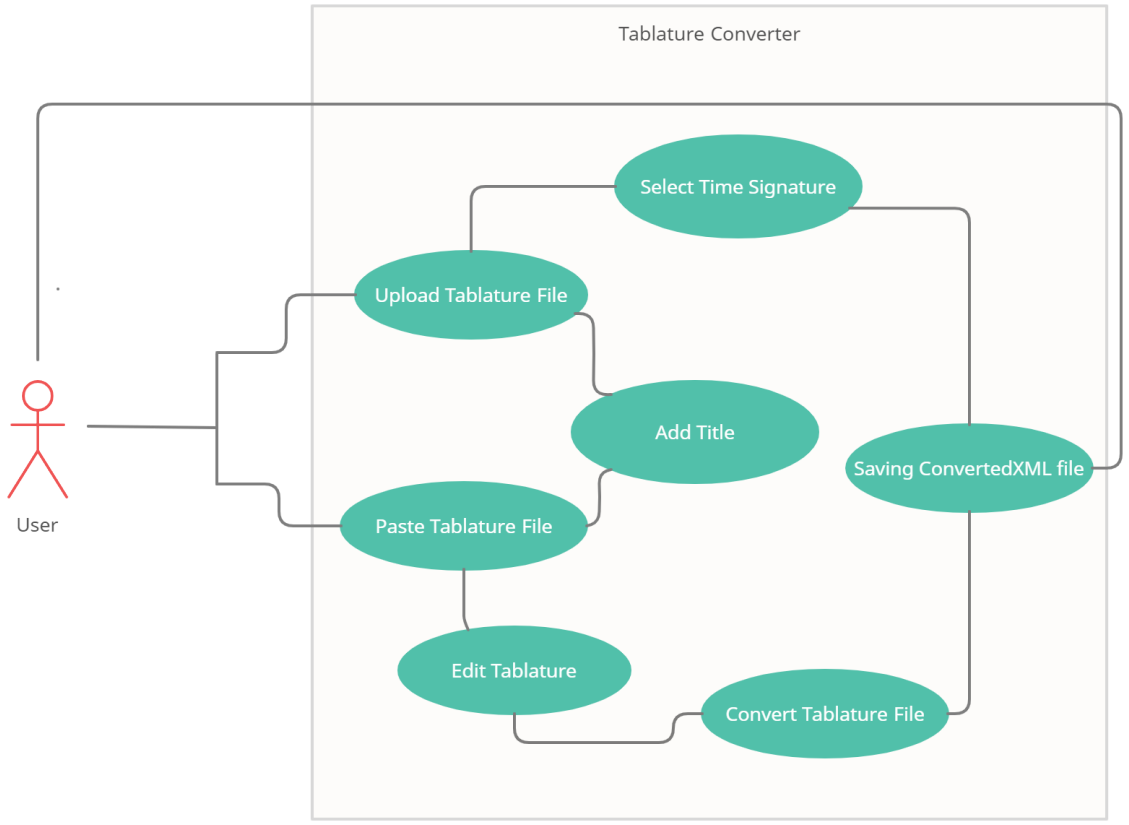
5.1.1 – The Beginner Musician

Persona	A student who is starting to learn guitar, bass, or drums. This student has the basic understanding of computers, as well as reading and learning songs from tabs, but the student is not proficient in either area.
Needs	To convert guitar tabs to MusicXML in order to play back the guitar tab in MuseScore or another MusicXML file playback tool. The MusicXML is played back to help the user understand how the guitar tab is supposed to sound like when played perfectly.
Frustrations	There is no free software to easily convert guitar tabs into MusicXML files. The free options don't include automatic tab parsing, and thus, requires a large amount of time and attention to detail to convert tabs to MusicXML files as.
Satisfaction Criteria	1. Completely accurate MusicXML output 2. An easy and intuitive user experience 3. The MusicXML file can be played without error on most major MusicXML playback tools (Musescore, Soundslice, etc).

5.1.2 – The Music Teacher

Persona	A teacher who prepares a number of customized scores for his students. These scores can include jazz standards transposed to different keys, transposed from piano to guitar or vice versa, songs with modified time signatures, etc.
Needs	To obtain a completely accurate MusicXML file that can be used in other MusicXML programs, such as MuseScore, for key transposition, changing the score's instruments, etc. Also needs to be able to edit tablature before converting in order to add different note timings, guitar techniques, and other customizations for their student.
Frustrations	There is no free software to easily convert guitar tabs into MusicXML files. There is also no software that enables the teacher to make custom edits to guitar tablature easily.
Satisfaction Criteria	1. Completely accurate MusicXML output 2. The ability to choose a certain time signature for the piece 3. Pre-conversion tablature editing capabilities 4. The MusicXML file can be played without error on most major MusicXML playback tools (Musescore, Soundslice, etc).

5.1.3 – Use Case Diagram



5.2 Use Cases

5.2.1 – File Conversion

Use Case Name	File Conversion
Primary Actor	User
Summary	The user's uploaded text file (.txt) should be converted into a MusicXML file.
Basic Flow	1. The use case starts on program start up. 2. The user selects and uploads a text file containing tablature. 3. The system detects which instrument the tablature is describing. 4. The system converts the text file into a MusicXML file for the appropriate instrument. 5. An output preview of the conversion can be displayed if the user presses the "Open MusicXML" button in the "Conversion Complete" menu.
Alternative Flows	Step 3: If neither a guitar, bass, or drum tablature is detected, the program throws an exception to the user and goes back to the program start-up menu.

5.2.2 – User File Editing

Use Case Name	User File Editing
Primary Actor	User
Summary	Allows the user to improve theMusicXML output by editing the text tablature.
Basic Flow	1. The use case starts when a text file is uploaded to the program. 2. The file contents are displayed in the textarea. 3. Users can edit the inputted tablature within the textarea.
Alternative Flows	Step 1: If an invalid file format is given, the program will throw an exception to the user and the program will go back to the program start-up menu.

5.2.3 – Save Converted XML File

Use Case Name	Save Converted XML file to a specified file path
Primary Actor	User
Summary	Allows the user to save the converted XML file to their local machines through a file explorer.
Basic Flow	1. The use case starts when the user is done with the conversion process. 2. The user presses the “Save File” button to choose a file path to save their converted MusicXML file to.
Alternative Flows	Step 2: If the conversion does not compile then the program will throw an exception and go back to the program start-up menu.

5.2.4 – Pasting Tablature into the Program

Use Case Name	Pasting Text File into the Program
Primary Actor	User
Summary	Allows the user to paste already copied tablature(textFile) into the text Area.
Basic Flow	1. The use case starts when the user opens the program. 2. The user pastes the already copied text file into the text area. 3. The user uses the “upload button” to select a text file for conversion.
Alternative Flows	Not applicable.

5.2.5 – Add Title For ConvertedXML

Use Case Name	Adding Title to convertedXML File
Primary Actor	User
Summary	Allows the user to add a title for the convertedXML File.
Basic Flow	1. The use case starts when the user intends on uploading a file or pasting a file for conversion. 2. The user adds a title in the “Title(optional)” field.
Alternative Flows	Not applicable.

5.2.6 – Select Time Signature

Use Case Name	Select time signature for XML File
Primary Actor	User
Summary	Allows the user to select a time signature for converted XML File.
Basic Flow	1. The use case starts when the user intends on uploading a file or pasting a file for conversion 2. The user clicks on the drop down icon under Time Signature and picks a selected Time Signature.
Alternative Flows	Step 2: If the user doesn't select a time signature, the program will assume that the inputted song has a time signature of 4/4.