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The Artificial Instructor

Why is it that so many people listen to music but do not play an instrument? Traditionally, if someone wants to learn an instrument they would have to take a class or hire an instructor. This can prove to be expensive and requires the student to adjust to the teachers available hours. My platform offers the public the convenience of learning an instrument from home. In order to produce the same, if not better, results that lessons from an instructor would produce the platform must simulate the role of the instructor in order to suggest lessons, show a user's progress, and give appropriate feedback.

In order to simulate a musical instructor the platform must track the notes the user plays, the rhythm the user is playing at, and the fingers being used to play each note. By tracking the notes and the rhythm the platform can track the user's ability and compare it to the expected results. Using this comparison the platform is able to provide a visualization of their results and give the user appropriate feedback. By tracking the fingers they use the platform can detect if there is a more optimal finger(s) to use in order to improve their execution.

The languages required to create this artificial instructor will be a mixture of Java, Python, and SQL. Java will be used to create the user interface, receiving sound input, and to custom object classes to allow users to have multiple types of audio input. For example, if the user has several types of bass guitars, such as a five string or a four string bass and a fretted bass or a fretless bass, they will be able to save different configurations in order to practice with each and track progress separately. The program will provide the classes pre-built with little configuration from the user. The interface will include only the essential information and features so the user is not overwhelmed. Sound input will include opening a connection to the computer's audio input port. The audio input data will be read in as a set of frequencies at a constant rate of time, python is necessary to translate that data into readable information to be output to the user. The final language that must be applied is a SQL database in order to allow the storage/access of a user's progress, custom songs and musical pieces the user uploads, and finally the data and information about the user's progress in order to create the feedback for output.

Users who do not know how to play will learn the correct techniques for playing, the notes on their instrument, and (*most importantly*) when they are wrong in order to correct the mistakes. Users who already know how to play an instrument can utilize the tools in order to “fine-tune” their skill set or create pieces of their own. By allowing users to upload their own audio files the platform can be used to help improve the timing and rhythm of instrument parts by supplying feedback. Giving feedback on the platform’s pre-set songs and lessons allows all users to not only practice some fundamentals but figure out which areas they may need improvement in.

Looking towards the future the platform has endless opportunities for expansion. Using video tracking we may be able to use built-in webcams to provide more feedback with posture and finger technique. Many types of music involve different pedals and hardware to change the sound that can be simulated using sound manipulation libraries. As the users become more advanced, it may prove helpful to allow a community of users to submit lessons so the available lessons and music can constantly grow. After the bass is mastered, the platform may be adapted to include different instruments such as guitar, drums, saxophone, and possibly vocals. Finally, music is universal and only evolves as time goes on, so the target audience has no range for age or cultural background, it aims to help any and all that are willing to learn.