**AC-10 — AI and Music Processing**

**Software Requirements Specification (SRS)**

CS 4850 - Section 03 – Fall 2024

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# Introduction

The AI and Music synthesis project is a research project that will use AI to generate or recognize music from or based on the different combinations of notes. The generated music will come from the different possible combinations recognized as a pattern during training. The project will also include work in recognizing a specific genre of music based on training of neural network in a similar genre.

## 1.1 Tutorial and Codes

* TensorFlow – Generate music using RNN (Recurrent Neural Network)
  + [Generate music with an RNN | TensorFlow Core](https://www.tensorflow.org/tutorials/audio/music_generation)
* New Code created by Dr. Choi for the training process

## 1.2 Project Goals (Scope)

* Test current dataset and model
* Construct a testbed for training NN
* Create a new model and test using existing dataset
* Build a new tutorial on Jupyter notebook
* Train a model on specific genre and test on different music to identify the genre

## 1.3 Definitions and Acronyms (Include Abbreviations)

* ML – Machine Learning
* MIDI – Musical Instrument Digital Interface
* NN – Neural Network
* RNN – Recurrent Neural Network

## 1.4 References

* Research on existing music synthesis software/apps
* Research Papers on Music Synthesis using AI and training models using

# 2.0 System Description

* The system will generate musical compositions and sound effects based on input data and parameters provided during the research.
* The music synthesizing model might be integrated into a different system and that will be determined by the project owner, Dr. Choi.

## 2.1 Environment

* Tools and software used – Jupyter Notebook
* Tensor Flow for deep learning
* MIDI Testbed for Model Training
* Programming Language – Python

## 2.2 User Characteristics

# 3.0 Functional Requirements

3.1 Model Capabilities

* The ML will be done using a selected method from the several method music lessons are provided.

3.2 Data

* Finding a training dataset and preparing it for processing
* Utilizing the big dataset for training

3.3 Model Training and Testing

* MIDI Testbed for Model Training

3.4 User Interface

* Input – input types will be MIDI
* Output – audio file/real-time playback, music notes and different graphs

## 3.5 Performance

* Realism of generated music
* Noise Management
* Consistency of output quality

# 4.0 External Interface Requirements (use if applicable)

## 4.1 Glossary

* Definition of terms in this document

## 4.2 Supporting Documentation

* Refer to the Design Document of the project

## 4.3 Issue Tracking

* Currently existing training models generate audio results with lots of noise.

## 4.4 Revision History