**SoC Summer 2022 Final Documentation**

**Project Name**

**Mentor Name**

**Keywords** (Include 7 or more keywords that will help others find your documentation easily)

*Musify , Music ,TensorFlow , LSTM , MIDI , Artificial Intelligence , Machine Learning , Deep Learning*

| **Team Member Name** | **Roll Number** | **Email-Id** |
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**Brief Description**

| ***Musify***  ***This project combined the fields of Music and Deep Learning to create an automatic music generation model.***  ***The code of this project runs in a Python environment .***  ***We make use of LSTM(Long Short Term Memory) which is a variant of RNN(Recurrent Neural Networks ) useful in music and text generation.***  ***Several libraries have been used in this project including Numpy ,TensorFlow , Music21 , Keras , tqdm.***  ***We have made use of MIDI(music) files to extract data about the notes and chords that are present in the music. Using this data, the Machine Learning model is then developed, trained, and tested, and new notes are predicted, creating a new piece of music.*** |
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**Progress**

| ***In the first meeting, we simply discussed the project in general and decided how to proceed; in essence, we established the project's timeline.***  ***We were only introduced to the project during the first week, and we read articles about artificial intelligence, neural networks, and machine learning and its applications in the field of music.***  ***We began by studying Python's fundamentals through tutorials on YouTube and its applications.***  ***I worked through a few simple programming exercises to become familiar with the language.***  ***After that, we switched to learning numpy, pandas, and matplotlib using YouTube lessons. I looked over a couple of these libraries' applications and discovered that they were really helpful for data analysis and for plotting different types of graphs.***  ***Up to this moment, I was able to understand everything. At our second meeting, we spoke about our progress and the next course of action. I started with TensorFlow, the primary software we intended to employ to carry out our project. TensorFlow was quite tricky for me to understand. I then turned to my mentors for assistance and inquired about how deep we should dive into TensorFlow at this stage. So I just did the basics of TensorFlow and watched tutorials on how simple machine learning models are constructed and the various algorithms employed.***  ***Then we entered the last phase of our project .***  ***We started with the implementation of our code after learning all about the libraries and packages we would be using in it.***  ***Our mentors posted a link to the code that had to be implemented along with a description of the code's various steps. I first understood the code, then I tweaked portions of the code before implementing it. I first ran into a few issues during implementation, but after working through them with my mentors, I was able to properly run the code and receive the generated music file.*** |
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**Results**

| ***I have successfully built an automatic music generation model using music files of different composers .***  ***Here are the links to various files in my project :***  ***Github Repository(It contains all the files used in the project )-***[***Aryan0103/MUSIFY (github.com)***](https://github.com/Aryan0103/MUSIFY)  ***Generated music file - https://drive.google.com/file/d/1YyQ\_qZ84XC012gWfTwxc-e1efNsEqNAh/view?usp=sharing***  ***Presentation -***[Musify.pptx](https://docs.google.com/presentation/d/1V1nhHNZ_4K-7j4c1eroxa7UB24N_yzD6/edit?usp=sharing&ouid=108142557494292628104&rtpof=true&sd=true)  ***Video - https://drive.google.com/file/d/1mIcBiJ7tr8mlmTawbL\_dVV8qpu9-rZ0s/view?usp=sharing*** |
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**Learning Value**

| **Throughout the course of this project , I picked up a lot of new skills.**   * **Fundamentals of Python** * **Different modules of Python- Pandas , Numpy , Matplotlib , TensorFlow** * **Fundamental concepts and methods used in Machine Learning & Artificial Intelligence like core learning algorithms, deep learning with neural networks.** * **Building and testing simple Machine Learning models.** |
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**Software used**

| **Softwares - VS Code**  **Libraries - Python , Pandas , Numpy , Matplotlib , TensorFlow , Music21 , Keras , tqdm** |
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**Suggestions for others**

| ***It is a wonderful project to get started and dive into the field of Machine Learning and Deep Learning .***  ***You will be able to master the deep learning tool TensorFlow as well as a number of Python modules and packages which are really helpful.*** |
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**References and Citations**

| ***I have referred to my mentor’s github repository.***  ***Here is the link to the repository*** [***https://github.com/abhijit-kr/MUSIFY---Music-Composition-using-AI***](https://github.com/abhijit-kr/MUSIFY---Music-Composition-using-AI)  ***Link to the dataset for MIDI files***  [***Classical Music MIDI | Kaggle***](https://www.kaggle.com/datasets/soumikrakshit/classical-music-midi) |
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