# Application for Transcribing Grand Piano Recordings to Sheet Music in PDF

Computer Engineering Project
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# Project Overview

**Objective**:

Transcribe grand piano recordings into sheet music PDF.

**Motivation**:

As a pianist and Computer Engineering student, I created this project to leverage AI for accurately transcribing piano recordings into sheet music, making the process more efficient and accessible for musicians and educators.

# Project Goals

**Primary Goals:**

- Accurate transcription of piano recordings
- Easy-to-use application for users
- Local processing for privacy and accessibility

# Technologies Used

**Languages and Libraries:**

- Python
- Librosa
- Piano Transcription Inference
- Music21
- MuseScore API
- PySide6
- VLC
- Pdf2image
- Tempfile
- WSL2
- X server

# System Architecture

**Components:**

- Audio Processing
- AI Model for Transcription
- Postprocessing Algorithm
- PDF Generation
- User Interface

# AI Model Architecture

**Key Points:**

- Log mel spectrogram as input
- Convolutional layers for feature extraction
- biGRU layers for temporal dependencies
- Continuous onset and offset time prediction
- Velocity estimation

# Training Model

**Dataset**: MAESTRO dataset

**Preprocessing:**
- Monophonic audio, resampled to 16 kHz
- Log mel spectrogram extraction

**Model Training:**
- Google Cloud
- One week of training on NVIDIA Tesla V100

# Implementation and Usage

For the implementation and usage of the application, I encourage you read the documentation and to visit the GitHub repository: https://github.com/mj300405/MP3_to_notes

The repository contains:
- README File: Detailed instructions on how to set up and run the application.
- Source Code: All the necessary code files for the application, including:
  - audio_processor.py: Handles the preprocessing of audio recordings.
  - transcription_worker.py: Uses the AI model to generate initial transcriptions.
  - Sheet_music_generation.py: Post-processes the AI model's output to create MIDI files.
  - generate_pdf.py: Converts MIDI files into sheet music PDFs using the MuseScore API.
  - window.py: Provides the user interface for the application.
  - AI files: model, training, config, evaluation, data generation, losses, utilities
- Commented Code: The code is well-commented to facilitate understanding and further development.

# Results and Accuracy

Accuracy:

- Onset F1 Score: 96.72%
- Pedal Onset F1 Score: 91.86%

Comparison with Original Sheet Music:

- High precision in notes, some differences in notation and tempo

# Future Work and Improvements

Potential Enhancements:

- Improved AI model for postprocessing
- Enhanced user interface with more features
- Support for additional output formats
- Performance optimizations
- Development of a web-based version