Bayesian Convolutional Neural Network Based Dominant Instrument Recognition in Polyphonic Music

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Outline

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Problem

Identify the dominant instrument**s** in **variable-length** polyphonic music.

- There may be more than one dominant instrument.
- Different music files usually have different lengths.

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IRMAS Dataset

- Used in the paper by Bosch et. al.
- Training Data:
    - There are 6705 audio files with 3 second excerpts.
    - 16-bit stereo, 44100 Hz sampling rate.
    - 11 different classes: cello, clarinet, flute, acoustic guitar, electric guitar, organ, piano, saxophone, trumpet, violin, voice.
    - For each audio file, there is **only one label**.
- Test Data:
    - 2874 audio files with variable lengths.
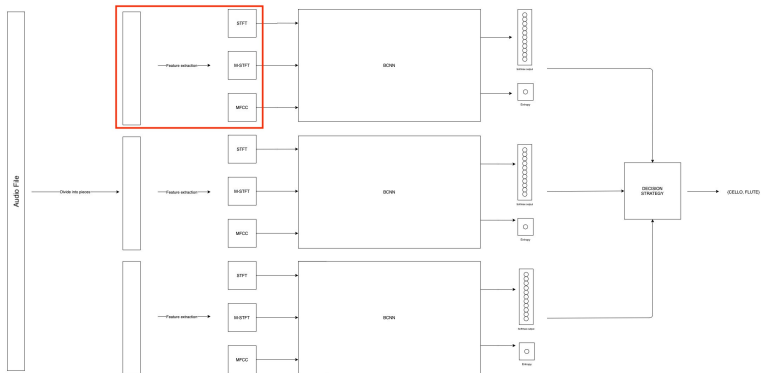   - For each audio file, there are **multiple labels**!
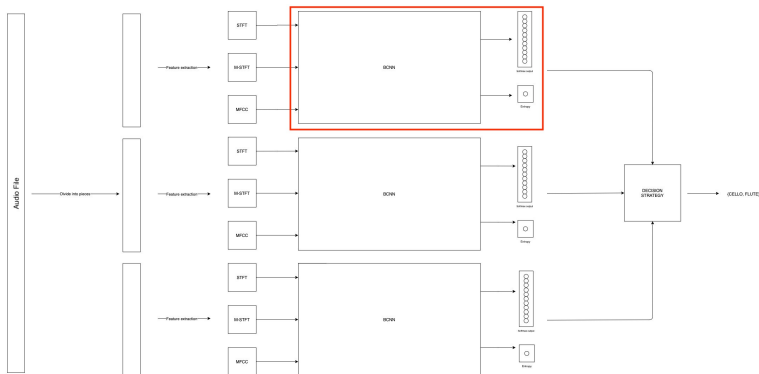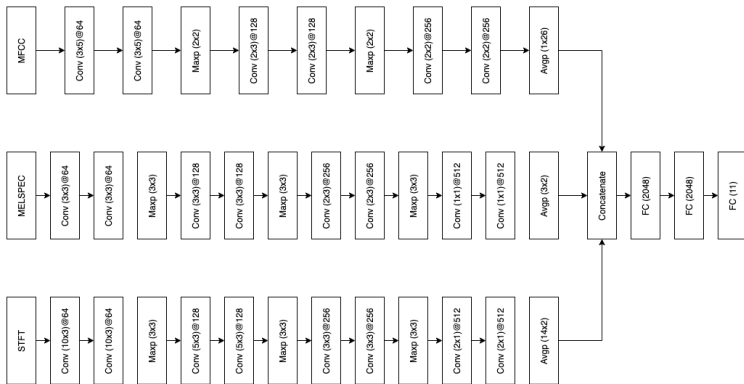
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Feature Extraction

BCNN

- It is hard to obtain the posterior distribution and calculate the predictive distribution.
- Variational inference, Monte Carlo integration.
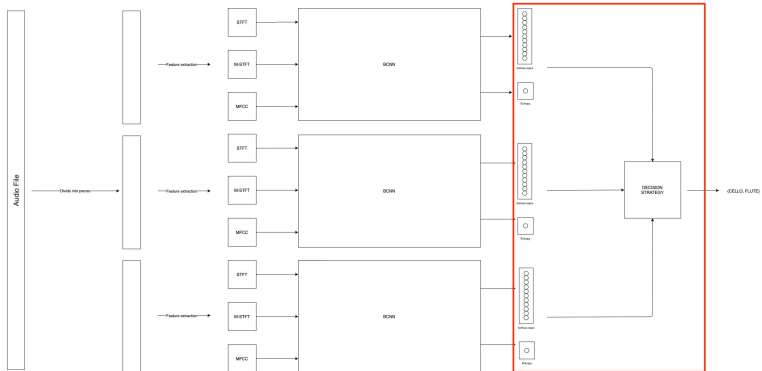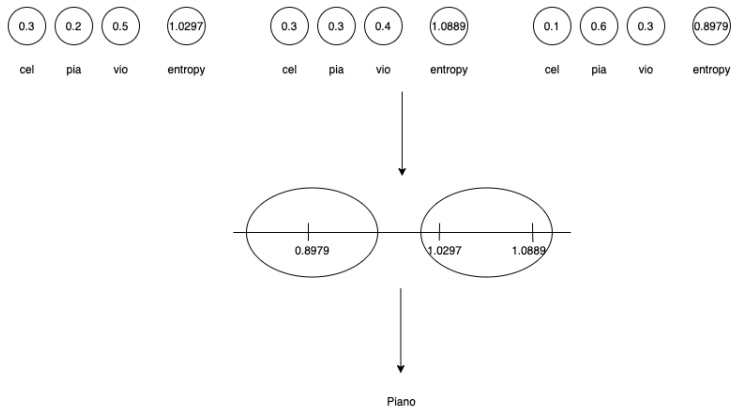
Model

Decision Strategy

- Take the average of the softmax outputs
- K-means based decision strategy

K-Means Based Decision Strategy

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Results