Capstone Project Proposal Template

Notes:

- This should take no more than one hour to complete – the clearer you are about the business problem you're working to solve with your ML-driven solution, the easier your proposal will be to complete
- This will be uploaded to your repo, which will be a part of your final submission
- Due date for submission is 12/9

Instructions:

1. Download this document as a Word Doc
2. Answer each question using a few sentences, at most
3. Save your completed proposal as a PDF
4. Create a project GitHub repo (if you have yet to do so)
5. Add your instructor as a collaborator (username nickmccarty) to your project repo
6. Add your mentor as a collaborator
7. Push your proposal PDF (created in Step 3) up to your repo
8. Copy the URL corresponding to the location of the PDF in your repo
9. Submit the copied URL using this link

Drum Transcription

Business Understanding

- What problem are you trying to solve, or what question are you trying to answer?
    - This project aims to convert an audio recording of drums being played into a plain text drum transcription. The model will be trained to differentiate between different sounds, then map the timing out in vectors, which will then be printed out in plain text.
- What industry/realm/domain does this apply to?
    - This work pertains to the music industry but could also be used by fledgling drummers to translate audible notes to a more digestible form to practice with.
- What is the motivation behind your project? (Saying you needed to do a capstone project for flatiron is not an appropriate motivation)
    - As a self-taught drummer of 12 years, I find plain text drum transcriptions easy to follow and friendly to those who can't read traditional notation.

Data Understanding

- What data will you collect?

    - .wav or other audio files of drums being played. I currently have 4,000 samples of individual drums or cymbals being played in different ways. The next step would be to create samples for combinations of notes.
- Is there a plan for how to get the data (API request, direct download, etc.)?
    - Direct download. May also use my e-drum kit to create some sample data to work with.
- Are the features that will be used described clearly?
    - The features are frequency vectors so far. They can then be charted as a spectrogram using Fourier transformations.

Data Preparation

- What kind of preprocessing steps do you foresee (encoding, matrix transformations, etc.)?
    - Fortunately, the vectors used currently do not need any additional processing – or so I believe.
- What are some of the cleaning/pre-processing challenges for this data?
    - I think audio files with a different sample rate may become a challenge, but the library I use, librosa, may have a workaround for that.

Modeling

- What modeling techniques are most appropriate for your problem?
    - Research suggests that convolutional neural networks (CNN) are highly regarded when it comes to not only image data, but audio data. Since I can convert the audio to spectrograms (which is a type of chart/image), CNN is applicable.
- What is your target variable? (remember - we require that you answer/solve a supervised problem for the capstone, thus you will need a target)
    - Given the nature of this project, the target will be the drum component, or combination thereof, that is played.
- Is this a regression or classification problem?
    - Multi-class classification

Evaluation

- What metrics will you use to determine success (MAE, RMSE, etc.)?
    - Accuracy

Tools/Methodologies

- What modeling algorithms are you planning to use (i.e., decision trees, random forests, etc.)?
    - CNN