

NLP:

1. Language generation

- Generating likely/possible word sequences from the distribution of words in a given text dataset
- e.g. Sherlock Holmes stories generator:
<https://www.kaggle.com/code/zahidunnabi/markov-chain-nlp>

2. POS tagging

- Parts of speech as hidden states
- Text data with labeled POS (S = {NOUN, VERB, NOUN, NOUN})
- e.g.
<https://www.kaggle.com/code/nilaychauhan/part-of-speech-tagging-with-hidden-markov-models>

3. Statistical parsing

- Most likely context free parse of a sentence
- Dependencies in sentence structure are found
- Relates heavily to POS tagging
- Interesting article:
<https://medium.com/analytics-vidhya/universal-dependencies-a-hidden-markov-quest-drem-yol-lok-2ca930ffc94f>

4. Speech recognition

- Recognition of individual words or any continuous speech
- Audio speech data is separated into units such as at the phone or phoneme level (data prep: continuous speech segmented into time series data)
- Classification task that uses the
<https://github.com/prakashpandey9/IsolatedSpeechRecognition>
- ^ This is the github page for the same paper Russell linked in resources (you can see the practical project here)
- <https://maharshi-veluri.medium.com/understanding-and-implementing-speech-recognition-using-hmm-6a4e7666de1>
- ^ simple HMM recognition model
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Financial:

1. Stock price forecasting

- Predict stock closing price for a day given the opening price
- <https://rubiksgcode.net/2021/09/06/stock-price-prediction-using-hidden-markov-model/#:~:text=HMMs%20are%20capable%20of%20predicting,processsing%2C%20and%20financial%20market%20prediction>

2.

Visual time series data:

1. Target tracking / motion capture
 - <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.139.8826&rep=rep1&type=pdf>

Bioinformatics:

Other:

1. Signal processing:

https://colab.research.google.com/github/EEA-sensors/sequential-parallelization-examples/blob/main/python/temporal-parallelization-inference-in-HMMs/phmm_viterbi.ipynb

General tasks and ideas:

1. Any classification task using HMMs:
 - A separate HMM model may be trained for each categorization so sequences may be classified through finding the model and thus category which the unseen sequence has the highest probability in (using forward algorithm)
2. Prediction of following state:
 - Used in forecasting
 - Perhaps somehow applicable to game play (strategic games) if enough data can be found for e.g. chess games
3. Generation of sequences