Programming 1: Hidden Markov Model for Named Entity Recognition	(30 points)

In the following programming problems, you are going to implement models for the Named Entity Recognition (NER) task. NER is the task to associate the words in a sentence with their proper name tags. For example, "Marie Curie" may correspond to the tag PER (person) and "Princeton University" may correspond to the tag ORG (organization). In this programming assignment, will use a total of 5 tags: PER (person), ORG (organization), LOC (location), MISC (miscellaneous), and O (non-entity). For example, the correct tagging of the sentence "Steve Jobs founded Apple with Steve Wozniak ." is ⟨PER, PER, O, ORG, O, PER, PER⟩. Note that when consecutive words constitute a named entity, such as "Steve Jobs" in the previous example, they should both be tagged as PER.

In programming problem 1, you will implement the hidden Markov model (HMM) for this task.

Link to notebook: Colab notebook.

Programming 2: Max-Entropy Markov Model for Named Entity Recognition	(25 points)

The task is the same as the programming problem above. In programming problem 2, you will implement the MEMM model for this task.

Link to notebook: Colab notebook.