Course: **Natural Language Processing [A]** 17-August-2023 **(Spring 2023)**

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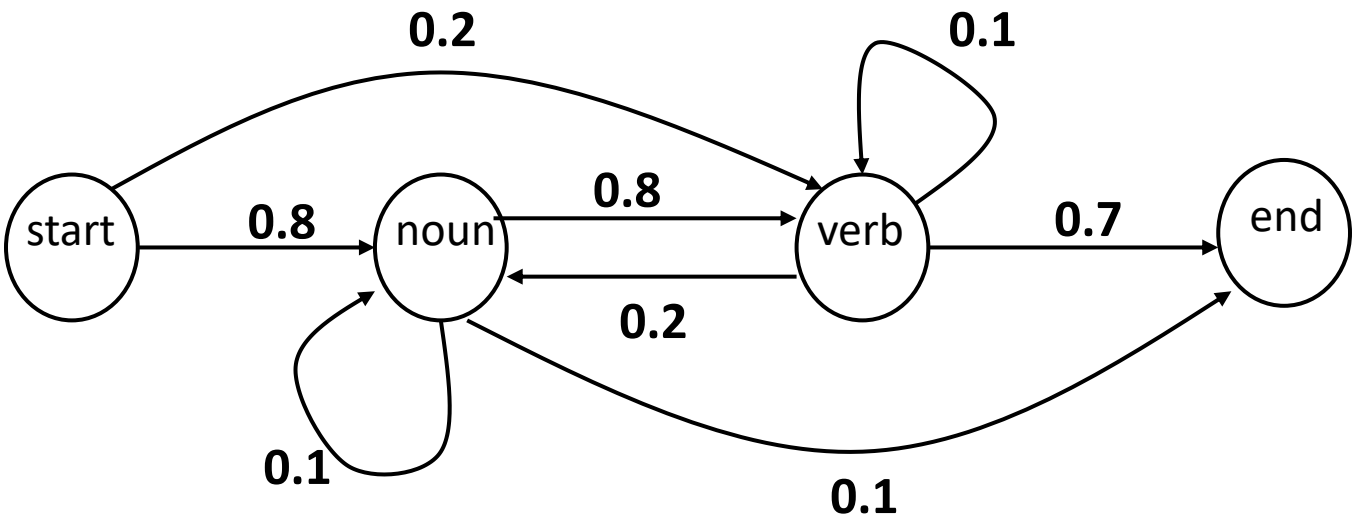
**QUIZ – 5 (POS Tagging and Viterbi Algorithm)**

**Total Points: 10**

# SOLUTION

Given the following POS HMM, and the Emission probabilities, use the Viterbi algorithm for finding the most appropriate POS tags for each word in the sentence: **Man shouts.**

## POS Hidden Markov Model:




## Emission Probabilities:

- **Noun:** P (Man | noun) = **0.7**, P (shouts | noun) = **0.3**
- **Verb:** P (Man | verb) = **0.5**, P (shouts | verb) = **0.5**

| | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| **start** | **1** | **0** | **0** | **0** |
| **verb** | **0** | **Token 1: Man**<br>**0.2*0.5 = 0.1** | **Token 2: shouts (if 'Man' is verb)**<br>**0.1*0.1*0.5 = 0.005**<br>**Token 2: shouts (if 'Man' is noun)**<br>**0.56*0.8*0.5 = 0.224** | |
| **noun** | **0** | **Token 1: Man**<br>**0.8*0.7 = 0.56** | **Token 2: shouts (if 'Man' is verb)**<br>**0.1*0.2*0.3 = 0.006**<br>**Token 2: shouts (if 'Man' is noun)**<br>**0.56*0.1*0.3 = 0.0168** | |
| **end** | **0** | **0** | **-** | **0.224*0.7 = 0.1568**<br>**0.0168*0.1 = 0.00168** |

**Viterbi algorithm decode:**

**Man = noun**

**shouts = verb**

**END OF QUIZ SOLUTION**