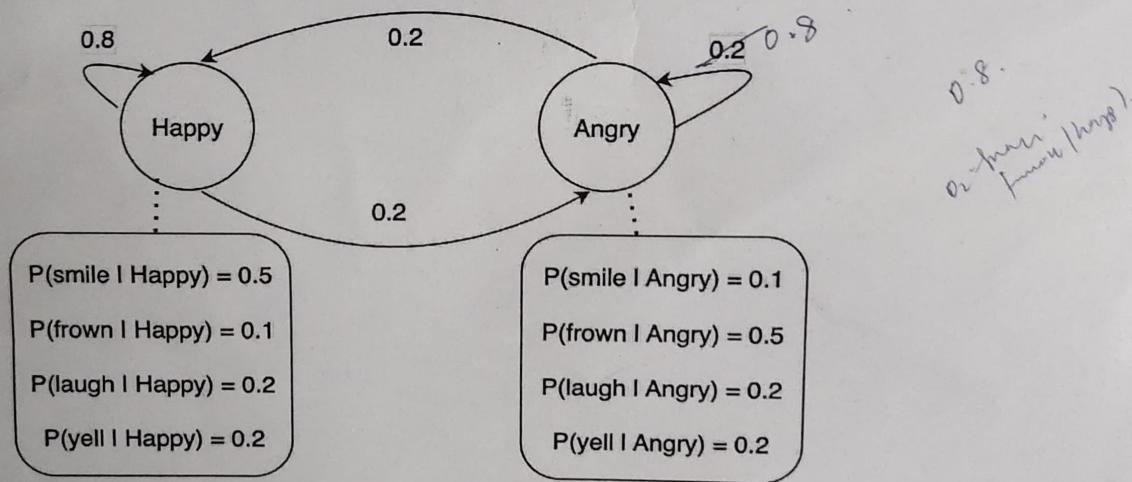


NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-15
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
B.TECH. DEGREE, VII SEMESTER, II CYCLE TEST, OCT-2025
CSPE73 – Natural Language Processing

DATE: 16-10-2025 TIME: 11.00 a.m. – 12.00 p.m. **MAX.MARKS:20 marks**
Answer all the Questions **5 x 4=20 marks**

1. Briefly explain the modern Text to Speech pipeline.
2. Find the similarity between two documents using cosine similarity. Use Bag of words for the vector representation of the documents.
 Document 1: "Deep Learning can be hard"
 Document 2: "Deep Learning can be simple"
3. Explain the architecture of the Question Answering system briefly.
4. Write short notes on the different approaches used in the Machine Translation.
5. Mr. X is happy someday and angry on other days. We can only observe when he smiles, frowns, laughs, or yells but not his actual emotional state. Let us start on day 1 in the happy state. There can be only one state transition per day. It can be either to happy state or angry state. The HMM is shown below;



Assume that q_t is the state on day t and o_t is the observation on day t. Answer the following

- What is $P(q_2 = \text{Happy})?$ 0.8
- What is $P(o_2 = \text{frown})?$ 0.18
- What is $P(q_2 = \text{Happy} | o_2 = \text{frown})?$ 0.44
- What is $P(o_1 = \text{frown}, o_2 = \text{frown}, o_3 = \text{frown}, o_4 = \text{frown}, o_5 = \text{frown}, q_1 = \text{Happy}, q_2 = \text{Angry}, q_3 = \text{Angry}, q_4 = \text{Angry}, q_5 = \text{Angry})$ if $\pi = [0.7, 0.3]?$

----- Best Wishes -----

$$\begin{aligned}
 & \text{Handwritten notes: } 0.1 \times 0.8 + 0.5 \times 0.2 = 0.5 \\
 & \text{Handwritten notes: } 0.8 \times 0.1 + 0.5 \times 0.2 = 0.1 \\
 & \text{Handwritten notes: } 0.1 \times 0.8 \times 0.1 + 0.5 \times 0.2 \times 0.1 = 0.01 \\
 & \text{Handwritten notes: } 0.8 \times 0.1 \times 0.1 + 0.5 \times 0.2 \times 0.1 = 0.01 \\
 & \text{Handwritten notes: } 0.1 \times 0.8 \times 0.1 \times 0.1 + 0.5 \times 0.2 \times 0.1 \times 0.1 = 0.001 \\
 & \text{Handwritten notes: } 0.8 \times 0.1 \times 0.1 \times 0.1 + 0.5 \times 0.2 \times 0.1 \times 0.1 = 0.001
 \end{aligned}$$