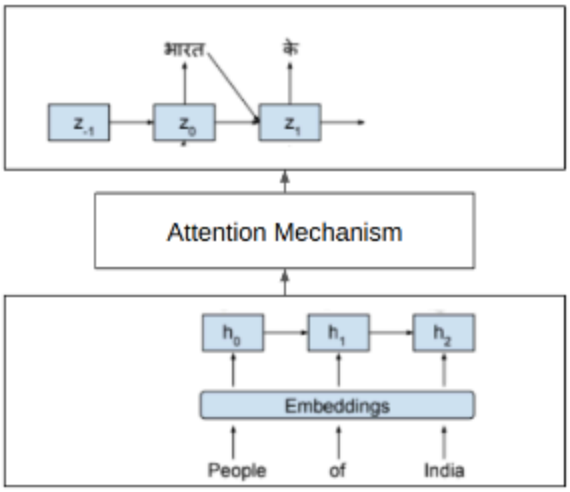
CSE556: NLP - Quiz 2 (Mandatory)

Marks: 15
Duration: 30 mins **Date:** 03-Apr-2024

1. Write the **equations** for computing the current decoding state, (i.e., z_i) using the attention mechanism. Assume necessary variables. [4]



Four equations. One mark each.

$$c_i = \sum a_{ij} h_j$$

$$a_{ij} = \frac{\exp(e_{ij})}{\sum \exp(e_{ik})}$$

$$e_{ij} = a(z_{i-1}, h_j)$$

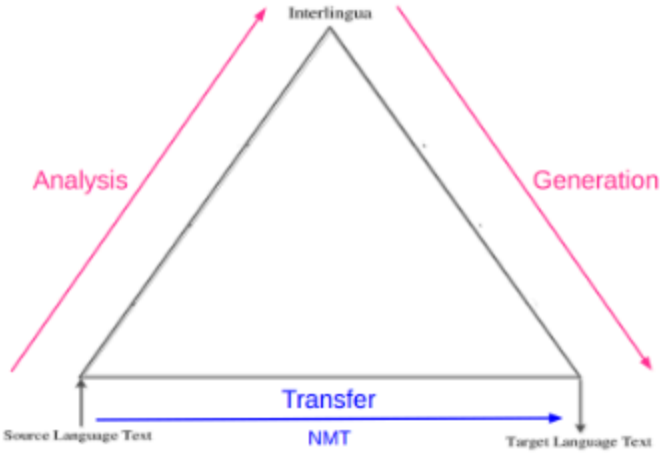
$$z_i = f(z_{i-1}, y_{i-1}, c_i)$$

2. Describe the process of **Interlingua-based MT** and **Neural MT** as per the stages of the Vauquois triangle. [3+3]

The Vauquois triangle has three stages.

	Interlingua	NMT
Analysis	Analysis to obtain an intermediate representation	No
Transfer	No transfer	Direct transfer
Synthesis	Synthesis to generate target language from intermediate representation.	No

OR



3. Describe the five denoising operations of BART with examples. Consider the following sentence for the example: $w_1\ w_2\ w_3\ w_4\ .\ s_1\ s_2\ s_3\ s_4\ .$ Where W and S are two sentences. [5]

- **Token Masking**: Masked Language Modeling.

$$w_1\ [\text{mask}]\ w_3\ [\text{mask}]\ .\ s_1\ s_2\ [\text{mask}]\ s_4\ . \Rightarrow w_1\ w_2\ w_3\ w_4\ .\ s_1\ s_2\ s_3\ s_4\ .$$

- **Token Deletion**: Random tokens are deleted. Model predicts the positions of missing inputs.

$$w_1\ w_3\ .\ s_1\ s_2\ s_4\ . \Rightarrow 2, 4, 8$$

- **Sentence Permutation**: Sentences are shuffled in a random order.

$$s_1\ s_2\ s_3\ s_4\ .\ w_1\ w_2\ w_3\ w_4\ . \Rightarrow w_1\ w_2\ w_3\ w_4\ .\ s_1\ s_2\ s_3\ s_4\ .$$

- **Document Rotation**: A randomly chosen token is made the first token. Model identifies the start of the document.

$$s_3\ s_4\ .\ w_1\ w_2\ w_3\ w_4\ .\ s_1\ s_2 \Rightarrow w_1\ w_2\ w_3\ w_4\ .\ s_1\ s_2\ s_3\ s_4\ .$$

- **Text Infilling**: Multiple tokens (span) are masked with a single masked token.

$$w_1\ [\text{mask}]\ .\ s_1\ [\text{mask}]\ s_4\ . \Rightarrow w_1\ w_2\ w_3\ w_4\ .\ s_1\ s_2\ s_3\ s_4\ .$$

– 0.5 marks for name and definition. 0.5 mark for example.