**Assignment - 6**

1. What are Vanilla autoencoders

Ans: Vanilla autoencoders are a type of neural network architecture used for unsupervised learning and dimensionality reduction. They consist of an encoder network that compresses the input data into a lower-dimensional representation (latent space) and a decoder network that reconstructs the original input from the latent space representation. The goal of vanilla autoencoders is to learn a compact and informative representation of the input data.

1. What are Sparse autoencoders

Ans: Sparse autoencoders are a variant of autoencoders that impose sparsity constraints on the latent space representation. In sparse autoencoders, only a small number of neurons in the hidden layer are activated for any given input, leading to a sparse representation. Sparse autoencoders are useful for feature learning and can help identify the most relevant features in the data.

1. What are Denoising autoencoders

Ans: Denoising autoencoders are designed to reconstruct clean data from corrupted or noisy input. They are trained to map noisy input data to clean output data by learning to remove noise or corruption. Denoising autoencoders are effective for feature learning and can learn robust representations that are resilient to noise in the input data.

1. What are Convolutional autoencoders

Ans: Convolutional autoencoders are autoencoders that use convolutional layers in the encoder and decoder networks. They are specifically designed for handling high-dimensional input data such as images. Convolutional autoencoders preserve the spatial structure of the input data and are capable of capturing local patterns and features.

1. What are Stacked autoencoders

Ans: Stacked autoencoders, also known as deep autoencoders, are composed of multiple layers of encoder and decoder networks stacked on top of each other. Each layer learns a hierarchical representation of the input data, with higher layers capturing more abstract and complex features. Stacked autoencoders are capable of learning highly expressive representations and are used for tasks such as feature learning and data generation.

1. Explain how to generate sentences using LSTM autoencoders

Ans: LSTM autoencoders are autoencoders that use Long Short-Term Memory (LSTM) units in the encoder and decoder networks. LSTM autoencoders are capable of capturing long-range dependencies in sequential data and are commonly used for tasks such as sequence-to-sequence prediction and text generation. To generate sentences using LSTM autoencoders, the decoder network is conditioned on a latent space representation generated by the encoder network, and then it generates words sequentially based on the context and the learned patterns in the data.

1. Explain Extractive summarization

Ans: Extractive summarization is a text summarization technique where key sentences or passages are selected from the original text and concatenated to form a summary. In extractive summarization, the summary consists of verbatim excerpts from the original text, and the goal is to extract the most important and relevant information while preserving the original meaning.

1. Explain Abstractive summarization

Ans: Abstractive summarization is a text summarization technique where a summary is generated by paraphrasing and synthesizing information from the original text. Unlike extractive summarization, abstractive summarization involves generating new sentences that may not appear in the original text. Abstractive summarization requires natural language understanding and generation capabilities and aims to produce concise and coherent summaries that capture the main ideas of the text.

1. Explain Beam search

Ans: Beam search is a search algorithm commonly used in sequence generation tasks, such as machine translation and text generation. It explores the space of possible sequences by maintaining a fixed number of candidate sequences (beams) at each step and expanding them based on the likelihood of the next token. Beam search efficiently explores the search space and is capable of generating high-quality sequences by considering multiple candidate options at each step.

1. Explain Length normalization

Ans: Length normalization is a technique used to mitigate the bias towards shorter sequences in sequence generation tasks, such as machine translation and text summarization. Length normalization adjusts the scores of candidate sequences based on their lengths to prevent shorter sequences from being favored over longer sequences during decoding. This helps produce summaries or translations that are more balanced in terms of length and content.

1. Explain Coverage normalization

Ans: Coverage normalization is a technique used in sequence-to-sequence models to encourage the model to attend to all parts of the input sequence during decoding. Coverage normalization penalizes the model for attending to the same parts of the input sequence multiple times, thereby promoting more comprehensive coverage of the input sequence in the output sequence.

1. Explain ROUGE metric evaluation

Ans: ROUGE (Recall-Oriented Understudy for Gisting Evaluation) is a set of metrics used to evaluate the quality of automatic summaries by comparing them to reference summaries or human-generated summaries. ROUGE measures the overlap between n-grams (contiguous sequences of n words) in the candidate summary and the reference summaries, with higher scores indicating better agreement. ROUGE metrics are widely used in the evaluation of text summarization systems and are valuable for assessing the effectiveness of different summarization techniques.