Topic:-

Review report on Deep learning

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INTRODUCTION TO DEEP LEARNING

Recently, Deep learning has become the principal driver of numerous applications and its an ideal opportunity to truly take a gander at why this is the situation. With such huge numbers of different choices that we’ve been utilizing this for such a long time.

Definition of Deep learning

In simpler terms, deep learning is a type of technology that allows computer to learn from data in a way that’s inspired by how our own brains work. Instead of being explicitly programmed to preform specific tasks, deep learning models are trained on large amount of data. They learn to recognize patterns and make decisions based on the data.

Deep learning is a subfield of machine learning that focuses on artificial neural networks and algorithms inspired by the structure and function of the human brain, known as artificial neural networks. It is type of machine learning that allows computers to learn from large amount of data and make decisions based on that data.

A type of advance machine learning algorithm, known as artificial neural network (ANN) unpins most deep learning models. As a result, deep learning may sometimes be referred to as a deep neural learning or deep neural network (DNN).

CNN (CONVOLUTION NERUAL NETWORK)

It is a type of computer system designed to understand images and other visual information. It’s inspired by how our brain process what we see. Think of it as a smart way for computers to learn and recognize pattern in pictures.

Breaking down images: imagine you have a picture. A CNN looks at a small part to the pictures at the time like the squares. It checks for different things in each square, like lines, colours, patterns.

Layers by Layers: CNN built in layers so that it makes the target easy to understand and learn the code in sequential manner. The first layer focus on simple things, like lines and conners and the following layers focus on the complex stuff like faces and humans etc.

Making sense of new picture:

Once trained, a CNN can look at new pictures and figures out what’s there in the specific pictures it also get brief about the picture and known all the information for the image.

Fully connected layers in CNN:

The main purpose of fully connected layer is to learn non-linear combination of the high-level features extracted by the convolution layers. These layers are responsible for making predictions based on the features extracted from the input data.

Each neuron in a fully connected layer is connected to every neuron in the preceding layer is a flattened feature map from a convolutional layer, each neuron in the fully connected layer receives input from every pixel in the original images.

RNN (Recurrent Neural Network)

RNN is a type of artificial neural designed to recognize patterns in sequences of data, such as text, time series, or video frames.

Types of RNN

Vanishing Gradient Problem: Traditional RNNs can suffer from the vanishing gradient problem, where gradients diminish exponentially as they propagate backward in time leading to difficulties in learning long-term dependencies.

Long short-term memory: LSTM networks are a type of RNN that address the vanishing gradient problem by introduction a memory cell and different gating mechanism to control the follow of information. LSTMs are particularly in capturing long term dependencies in sequences.

APPLICATION OF RNN

* Natural Language processing: task such as language modeling, machine translation, sentiment analysis, and text generation benefit from RNNs due to their ability to model in text.
* Speech Recognition: RNNs can be used to recognize speech patterns and convert audio signals into text.
* Video Analysis: RNNs can analyse sequential data in video such as recognizing actions or gestures over time.

In summary, RNNs are powerful tools for modeling sequential data due to their ability to maintain internal state and process inputs in a time – dependent manner. They have found wide application in task requiring understanding and generation of sequential pattern across various domains in deep learning.

TRANSFORMER

­­It is a revolutionary model architecture in deep learning that has significantly impacted various natural language processing task, particularly in machine translation and language understanding.

KEY COMPONENT OF THE TRANSFORMER:

* Self-Attention Mechanism- This is the core building block of the Transformer. It allows the model to improve the importance of different words in a sequence when predicting or generating outputs. Each word is represented as a vector and is updated by attending to other words in the same sequence of their positions.
* Multi-Head Attention- To enhance the modeling capability of self-attention, the Transformer in multi-head attention. It computes attention multiple times in parallel with different learned linear projections of the input.

APPLICATION OF TRANSFORMERS:

Machine Translation- Transformers have achieved state-of-the-art performance in machine translation task, such as the WMT translation task.

Language Understanding: Models like BERT use transformer architectures for tasks like question answering, sentiment analysis, and named entity recognition.

Text Generation: Transformation are also used for text generation tasks, including dialogue generation, summarization, and story generation.

In summary, the transformer architecture has revolution in deep learning in NLP by level of self-attention mechanisms to capture complex generation in sequences efficiently. Its ability to process tokens in parallel and handle long-range makes it powerful tool for various sequential data tasks, and understanding and generation natural language.

CONCLUSION