

# DEEP LEARNING FOR IMAGE SEARCH

## WEEK\_3

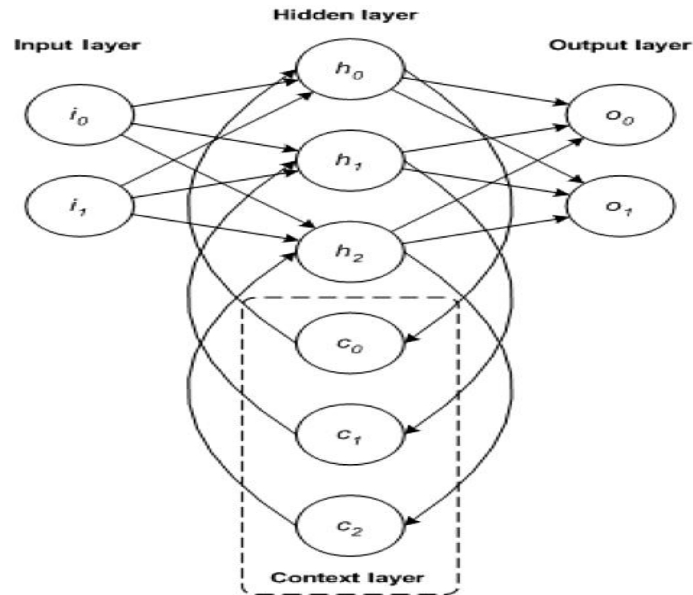
### DEEP LEARNING ARCHITECTURES:

- **Recurrent neural networks(RNN)**- Speech recognition, handwriting recognition
- **Convolution neural networks(CNN)**- Image recognition, video analysis, natural language processing
- **LSTM**-Natural language text compression, handwriting recognition, speech recognition, gesture recognition, image captioning
- **Deep beliefs networks(DBN)**- Image recognition, information retrieval, natural language understanding, failure prediction
- **Deep stacking networks(DSN)**- Information retrieval, continuous speech recognition

RNN	CNN
RNN is made up of one node. It is fed data then outputs a result back into itself, and continues to do this.	CNNs essentially have three parts, convolution layers, pooling layers, and fully-connected layers.
RNN unlike feedforward neural networks - can use their internal memory to process arbitrary sequences of inputs.	CNN is a type of feed-forward artificial neural network - are variations of multilayer perceptron which are designed to use minimal amounts of preprocessing.
RNNs are ideal for text and speech analysis.	CNNs are ideal for images and video processing.

### Basics of RNN:

The primary difference between a typical multilayer network and a recurrent network is that rather than completely feed-forward connections, a recurrent network might have connections that feed back into the same layer. This feedback allows RNNs to maintain memory of past inputs and model problems in time.



## DEEP LEARNING FRAMEWORKS:

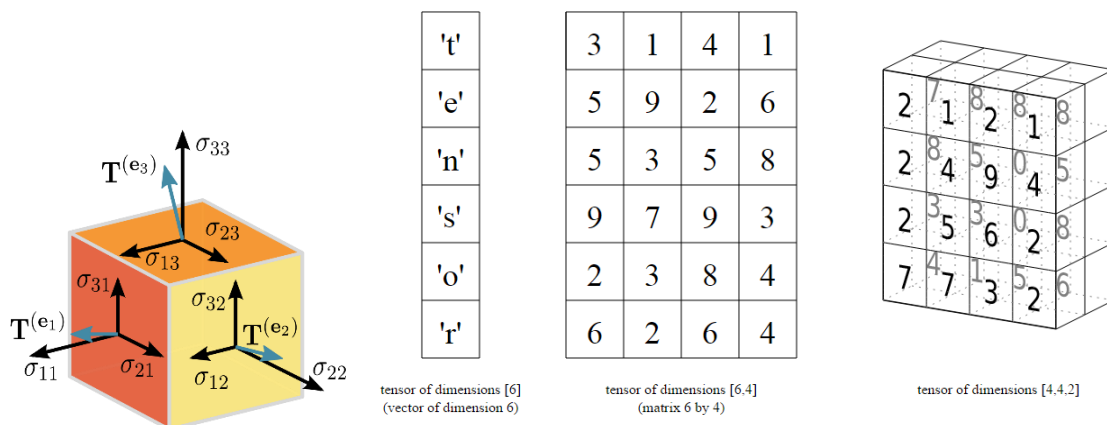
Implementing these deep learning architectures is certainly possible, but starting from scratch can be time-consuming, and they also need time to optimize. Many frameworks are available to build deep learning solutions. Every framework is different, built for a different purpose and offering a unique range of features.

1. 1.TensorFlow
2. 2.Caffe
3. 3.Keras
4. 4.DeepLearning4j

## **Brief Introduction to TensorFlow:**

Tensorflow is a Python-based library capable of running on multiple CPUs and GPUs.

Mathematically a Tensor is a N-dimensional vector, means a Tensor can be used to represent N-dimensional datasets.



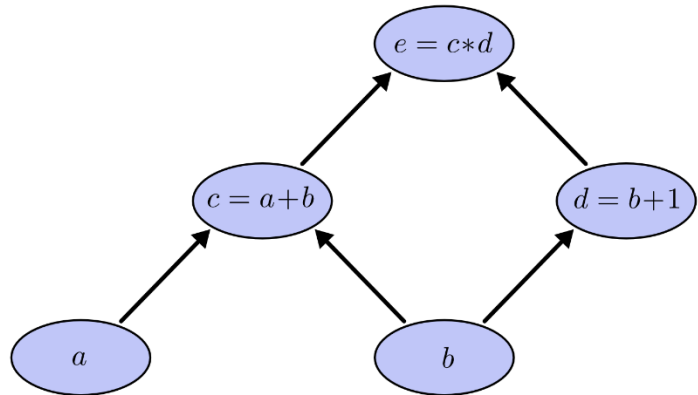
## So, difference between Arrays and Tensors?

The first is a type of function, the second is a data structure suitable for representing a tensor in a coordinate system. Tensors are defined as a multilinear function. A multi-linear function consists of various vector variables.

### Computational Graph:

A computational graph is a series of TensorFlow operations arranged into a graph of nodes.

Each node takes zero or more tensors as inputs and produces a tensor as an output. One type of node is a constant. Like all TensorFlow constants, it takes no inputs, and it outputs a value it stores internally.



### Other Frameworks:

#### Keras:

Though TensorFlow is a very good deep learning library, creating models using only TensorFlow can be a challenge, as it is a pretty low-level library and can be quite complex to use for a beginner. To tackle this challenge, Keras was built as a simplified interface for building efficient neural networks in just a few lines of code and it can be configured to work on top of TensorFlow.

#### Caffe:

It is a C++ library which also has a Python interface and finds its primary application in modeling Convolutional Neural Networks. Caffe supports a wide range of deep learning architectures, including CNN and LSTM,

#### DeepLearning4j:

Deeplearning4j is a popular deep learning framework that is focused on Java technology,