

# **Assignment 1 Solution**

## **Solution 1:**

### **1. Deep Learning for Customer Service:**

Deep learning is a subset of machine learning and it is inspired by the structure of a human brain. Deep learning algorithms attempt to draw similar conclusions as humans would by continually analyzing data with a given logical structure. To achieve this, deep learning uses a multi-layered structure of algorithms called neural networks. The design of the neural network is based on the structure of the human brain. Just as we use our brains to identify patterns and classify different types of data or information, neural networks are trained to do the same in a similar manner. We need to study all the aspects of the input and the possible outputs, because here we are relying on the machine to produce an appropriate output. For customer services that is essential. We can use deep learning to route customers through to the right agents, provide more meaningful solutions to customers, and much more. We basically need to enhance user experience with the use of deep learning.

### **2. Traditional AI vs Modern AI:**

Traditional AI is the AI developments across the globe in the period between 1950 and 2008. The term Artificial Intelligence was given in the year 1956. Prominent AI approaches back then were Expert Systems and Fuzzy Logic. The first major achievement was in the 1980s where an expert system in Synthesis of Integral Design. In the year 1997 IBM's supercomputer Deep Blue defeated world chess champion Garry Kasparov. As fast as mainframe

computers could run computations, they were only as smart as the programmers who accessed the data and coded how to look at it. The computer program – the AI – lacked the ability to know or truly understand the data it was seeing.

The term Data science was coined in the year 2008. This new field in computer science introduced advanced analytics that leveraged Statistics, Probability, Linear Algebra & Multivariate Calculus. In 2012 Convolutional Neural Networks were introduced. They also utilized Graphic Processing Units (GPU). AI requires a lot of computational power and GPUs provide exactly that. It has revolutionized the technology and redefined parallel processing.

### **3. Machine Translation:**

One of the earliest goals for computers was the automatic translation of text from one language to another. Machine translation is the task of automatically converting source text in one language to text in another language. Given a sequence of text in a source language, there is no one single best translation of that text to another language. This is because of the natural ambiguity and flexibility of human language. This makes the challenge of automatic machine translation difficult. There are four types of machine translation:

- Statistical Machine Translation (SMT)
- Rule-based Machine Translation (RBMT)
- Hybrid Machine Translation
- Neural Machine Translation

## **Solution 2:**

At the end of a particular program/course, evaluation of the course and the faculty has become an integral and important part of the education system. In the present scenario, mostly automated web forms are provided to evaluate faculty and the course, and students rate them on a particular scale on different types of questions. These questions are open-ended and can be endless. Moreover, in some institutions, even pen and paper format is preferred where analysis is far more difficult and can be biased as well. The goal of the process is to improve the ability of the faculty and improve the content and outcome of the course. This can be done through machine learning by reading the feedback and classifying it as positive, negative, and neutral. Basically, it is the sentiment analysis of the text written by the student. The text on which sentiment analysis is generally performed can be categorized broadly into two types: facts and opinions. Facts are objective expressions about entities, events, and their properties. Opinions are usually subjective expressions that describe sentiments, emotion, appraisal, or feeling. Lexicon based approach can be classified into dictionary-based approach and corpus-based approach. In dictionary-based approach a set of opinion-based words is collected as a seed. Then known dictionaries are used to expand the set of the words by adding synonyms. The newly added words are added to seed list. This process is continued until there are no words in the dictionary. At the end manual review is done to remove the errors. The major drawback of this approach is the inability to find domain and context specific words. The corpus-based approach overcomes the limitation of the dictionary-based approach. In addition to the seed word list, this approach identifies context specific opinion words. The finding of such words is based on syntactic or cooccurrence pattern in the text using linguistic constraints.

**Solution 3:**

Credit risk evaluation is of great importance to any financial institution because of the sole reason that studying this correctly may result in direct and immediate profit or loss. Therefore, assessing this correctly and accurately is of great importance. People tend to take loans to meet their consumer needs and therefore this is of high importance. There are a lot of factors on which the prediction might depend. For instance, the age of the person. A young person might be careless to handle loans and a very aged person might be unable to. Another factor is if the person is married or not. If we have a nominee or not is influential as well. Educational background of the person is also of great concern. A person with a good educational background is more learned about the procedure of these kind of things. Hence there are n numbers of factors which can be studied, and almost all of them provide a insight to the final decision. Hence, such a high computational task would require machine learning to come through, as there are a lot of factors to be studied and weightage of the factors is also considered. Under these constraints, the bank must establish mechanisms that, at the same time, comply with its social role and safeguard its financial soundness. For these complex models that need a high degree of parameter tuning, the use of hyperparameter optimization algorithms such as genetic algorithms are necessary to reach the best performance.

---

**Submitted By:** Bharat Goyal