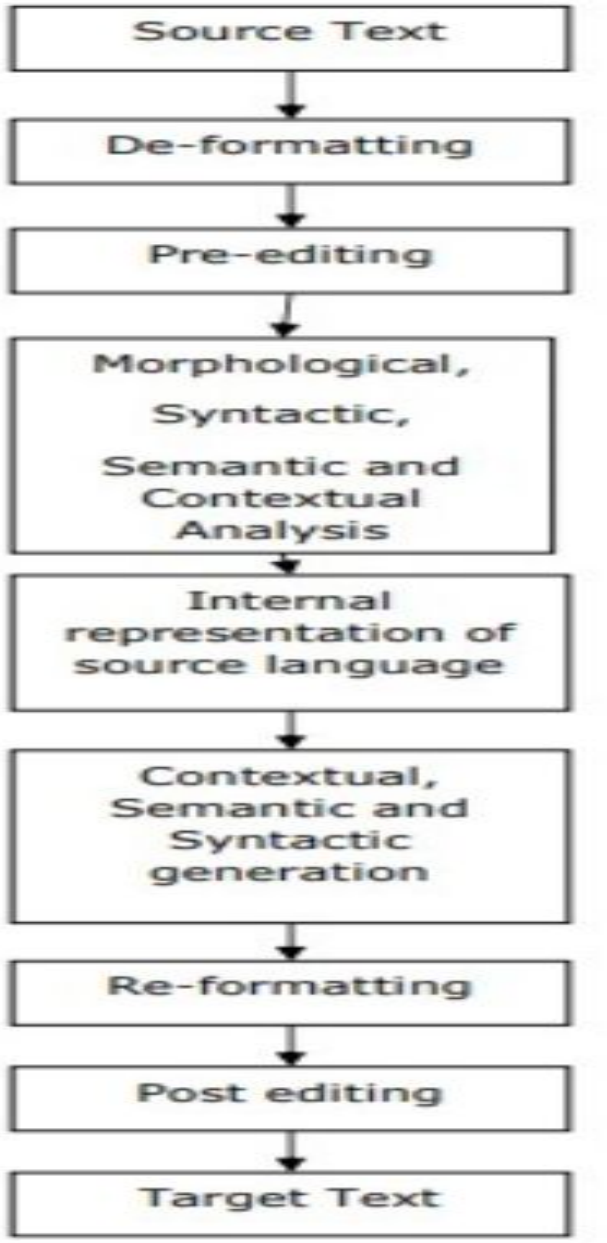
Machine Translation

- Machine translation (MT), process of translating one source language or text into another language, is one of the most important applications of NLP.
- Machine Translation (MT) is the task of automatically converting one natural language into another, preserving the meaning of the input text, and producing fluent text in the output language
- It refers to computerized systems responsible for producing translations with or without human assistance. It excludes computer-based translation tools that support translators by providing access to online dictionaries, remote terminology databanks, transmission and reception of texts, etc.

Machine Translation



NLP Applications

- Language Translator
- Social Media Monitoring
- Chatbots
- Survey Analysis
- Targeted Advertising
- Hiring and Recruitment.
- Voice Assistants.
- Grammar Checkers.

Business Intelligence and analytics

- Business intelligence is the process of collecting, storing and analyzing data from business operations.
- It provides comprehensive business metrics, in near-real time, to support better decision making.
- we can create performance benchmarks, spot market trends, increase compliance, and improve almost every aspect of your business with better business intelligence.
- It prioritizes on descriptive analytics, which provides a summary of historical and present data to show what has happened or what is currently happening.
- BI answers the questions “what” and “how” so we can replicate what works and change what does not.

- Business analytics (BA) refers to the practice of using the company's data to anticipate trends and outcomes.
- It includes data mining, statistical analysis, and predictive modeling that help make more informed decisions.
- It prioritizes on predictive analytics, which uses data mining, modeling and machine learning to determine the likelihood of future outcomes.
- BA answers the question "why" so it can make more accurate predictions about what will happen. With BA, you can anticipate developments and make the changes necessary to succeed.

Sentiment Analysis

- **Sentiment analysis** is a natural language processing technique used to determine whether data is positive, negative or neutral. Sentiment analysis is often performed on textual data to help businesses monitor brand and product sentiment in customer feedback, and understand customer needs.
- It is the process of detecting positive or negative sentiment in text. It's often used by businesses to detect sentiment in social data, gauge brand reputation, and understand customers.

- For example, using sentiment analysis to automatically analyze 4,000+ reviews about your product could help you discover if customers are happy about your pricing plans and customer service.
- Sentiment analysis models focus on polarity (positive, negative, neutral) but also on feelings and emotions (angry, happy, sad, etc), urgency (urgent, not urgent) and even intentions (interested v. not interested).

Deep Learning Algorithms

- **Deep Learning** is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called **artificial neural networks**.
- Deep learning is a subset of machine learning in artificial intelligence that has networks capable of learning unsupervised from data that is unstructured or unlabeled.
- It is a AI function that mimics the workings of the human brain in processing data for use in detecting objects, recognizing speech, translating languages, and making decisions.

- It is a form of machine learning, can be used to help detect fraud or money laundering, among other functions.
- Deep learning uses hierarchical neural networks to analyze data. Neuron codes are linked together within these hierarchical neural networks, similar to the human brain.
- Example-When deep learning is used to detect fraud, it will control several signals, such as IP address, credit score, retailer, or sender, to name a few.
  - In the first layer of its artificial neural network, it will analyze the amount sent.
  - In a second layer, it will build on this information and include the IP address.
  - In the third layer, the credit score will be added to the existing information, and so forth until a final decision is made.

Applications of Deep Learning

- Automatic speech recognition
- Image recognition
- Visual art processing
- Natural language processing
- Recommendation systems
- Medical Image Analysis
- Image restoration
- Financial fraud detection

Types of algorithms used in Deep Learning

1. Convolutional Neural Networks (CNNs)
2. Long Short Term Memory Networks (LSTMs)
3. Recurrent Neural Networks (RNNs)
4. Generative Adversarial Networks (GANs)
5. Radial Basis Function Networks (RBFNs)

- 1. Convolutional Neural Networks (CNNs)

CNN also known as ConvNets, consist of multiple layers and are mainly used for image processing and object detection. Yann LeCun developed the first CNN in 1988 when it was called LeNet. It was used for recognizing characters like ZIP codes and digits.

- 2. Long Short Term Memory Networks (LSTMs)
- LSTMs are a type of Recurrent Neural Network (RNN) that can learn and memorize long-term dependencies. Recalling past information for long periods is the default behavior.
- LSTMs retain information over time. They are useful in time-series prediction because they remember previous inputs. LSTMs have a chain-like structure where four interacting layers communicate in a unique way. Besides time-series predictions, LSTMs are typically used for speech recognition, music composition, and pharmaceutical development.

3. Recurrent Neural Networks (RNNs)

- RNNs have connections that form directed cycles, which allow the outputs from the LSTM to be fed as inputs to the current phase.
- The output from the LSTM becomes an input to the current phase and can memorize previous inputs due to its internal memory. RNNs are commonly used for image captioning, time-series analysis, natural-language processing, handwriting recognition, and machine translation.
- 4. Generative Adversarial Networks (GANs)
- GANs are generative deep learning algorithms that create new data instances that resemble the training data. GAN has two components: a generator, which learns to generate fake data, and a discriminator, which learns from that false information.
- The usage of GANs has increased over a period of time. They can be used to improve astronomical images and simulate gravitational lensing for dark-matter research. Video game developers use GANs to upscale low-resolution, 2D textures in old video games by recreating them in 4K or higher resolutions via image training.
- GANs help generate realistic images and cartoon characters, create photographs of human faces, and render 3D objects.
- 5. Radial Basis Function Networks (RBFNs)
- RBFNs are special types of feedforward neural networks that use radial basis functions as activation functions. They have an input layer, a hidden layer, and an output layer and are mostly used for classification, regression, and time-series prediction.

Advantages

- It lessens the need for feature engineering.
- It eliminate all those costs that are needless.
- It easily identifies difficult defects.
- It results in the best-in-class performance on problems.

Disadvantages

- It requires an large amount of data.
- It is quite expensive to train.
- It does not have strong theoretical groundwork.