Natural Language Processing

- Natural Language Processing (NLP) is a branch of AI that helps computers to understand, interpret and manipulate human language.
- NLP helps developers to organize and structure knowledge to perform tasks like translation, summarization, named entity recognition, relationship extraction, speech recognition, topic segmentation, etc.
- NLP is a way of computers to analyze, understand and derive meaning from a human languages such as English, Spanish, Hindi, etc.
- The understanding & generating text & speech
- The use of computers to process written and spoken language for some practical, useful, purpose: to translate languages, to get information from the web on text data banks so as to answer questions, to carry on conversations with machines, so as to get advice about, say, pensions and so on.
- The field of computer science devoted…enabling computers to use human languages both as input and as output

History of NLP

Here, is are important events in the history of Natural Language Processing:

1950- NLP started when Alan Turing published an article called "Machine and Intelligence."

1950- Attempts to automate translation between Russian and English

1960- The work of Chomsky and others on formal language theory and generative syntax

1990- Probabilistic and data-driven models had become quite standard

2000- A Large amount of spoken and textual data become available

How does NLP work?

Before we learn how NLP works, let's understand how humans use language-

Every day, we say thousand of a word that other people interpret to do countless things. We, consider it as a simple communication, but we all know that words run much deeper than that. There is always some context that we derive from what we say and how we say it., NLP never focuses on voice modulation; it does draw on contextual patterns.

Example:

```
Man is to woman as king is to __________?
Meaning (king) – meaning (man) + meaning ( woman)=?
The answer is-  queen
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Here, we can easily co-relate because man is male gender and woman is female gender. In the same way, the king is masculine gender, and its female gender is queen.

Example:

```
Is King to kings as the queen is to_______?
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The answer is--- queens
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Here, we can see two words kings and kings where one is singular and other is plural. Therefore, when the world queen comes, it automatically co-relates with queens again singular plural.

Here, the biggest question is that how do we know what words mean? Let's, say who will call it queen?

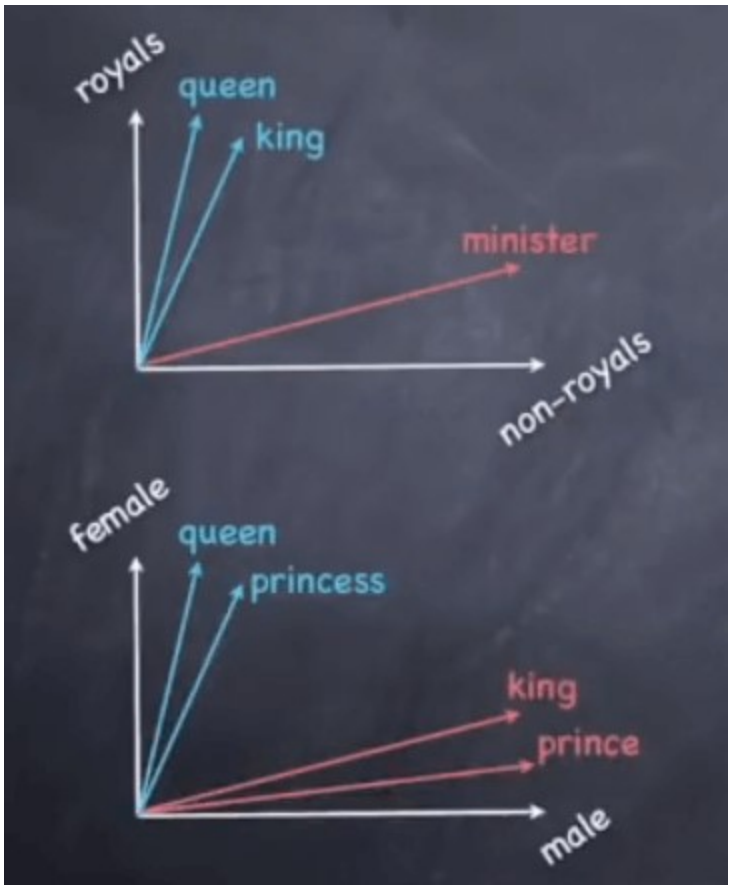
The answer is we learn this thinks through experience. However, here the main question is that how computer know about the same?

We need to provide enough data for Machines to learn through experience. We can feed details like

- Her Majesty the Queen.
- The Queen's speech during the State visit
- The crown of Queen Elizabeth
- The Queens's Mother
- The queen is generous.

With above examples the machine understands the entity Queen.

The machine creates word vectors as below. A word vector is built using surrounding words.



The machine creates these vectors

- As it learns from multiple datasets
- Use Machine learning (e.g., Deep Learning algorithms)
- A word vector is built using surrounding words.

Here is the formula:

Meaning (king) – meaning (man) + meaning (woman)=?

This amounts to performing simple algebraic operations on word vectors:

Vector (king) – vector (man) + vector (woman)= vector(?)

To which the machine answers queen.