**Word2Vec**

**Word2Vec** is a method used to represent words as numerical vectors while preserving their meanings. It was developed by Google in 2013 and helps machines understand word relationships.

**How Word2Vec Works**

Word2Vec uses a simple neural network to learn word representations. There are two main approaches:

1. **Continuous Bag of Words (CBOW)** – Predicts a word based on surrounding words.
2. **Skip-Gram** – Predicts surrounding words based on a given word.

For example, in the sentence **"The cat sits on the mat"**,

* **CBOW** tries to predict **"sits"** from **["The", "cat", "on", "the", "mat"]**.
* **Skip-Gram** tries to predict words like **"cat"** and **"mat"** from **"sits"**.

**How Word2Vec Learns**

1. The model starts with random word vectors.
2. It updates these vectors by analyzing large amounts of text.
3. Words that appear in similar contexts get similar vectors.

**Advantages**

* Captures word meanings and relationships.
* More efficient than traditional methods like Bag of Words.
* Can perform word arithmetic (e.g., king - man + woman ≈ queen).

**Limitations**

* Cannot handle unseen words.
* Does not consider sentence context.
* Does not recognize multi-word phrases.