NLP : Recurrent Neural Network

Video 5: Word Embedding

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Beyond Basic Vectorization Techniques

Count Vectorization & TF-IDF

Bag of words Models

Sequence based Models

Vectorization

One Hot Encoding

Countvectorizer

TF-IDF

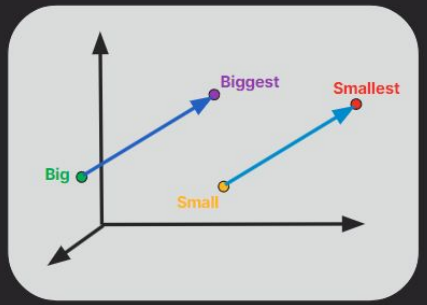
Word Embedding

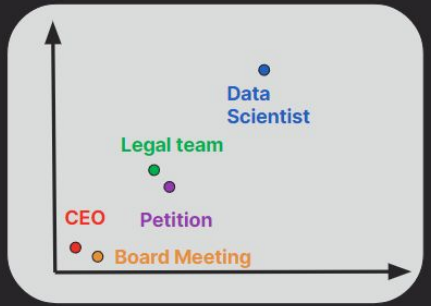
Word Embedding

Represents **words as vectors** of dimensions in a way that **captures their meanings, relationships, and context**.

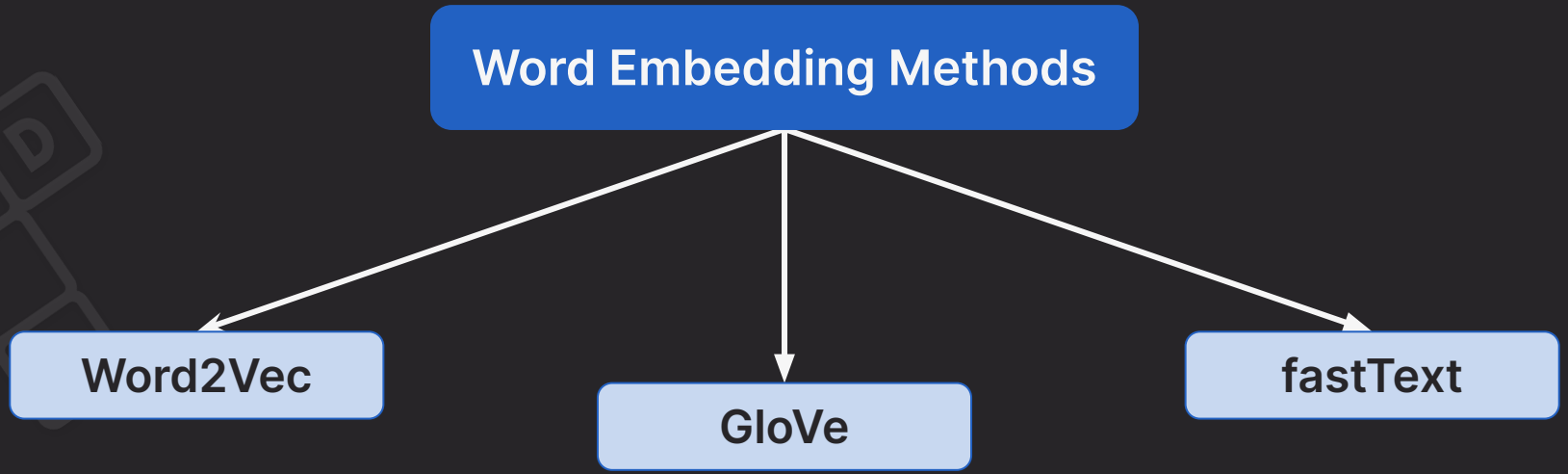
Vectors

CEO = [0.2, -0.7,.....,0.6]
CTO = [0.5, -0.6,.....,0.7]

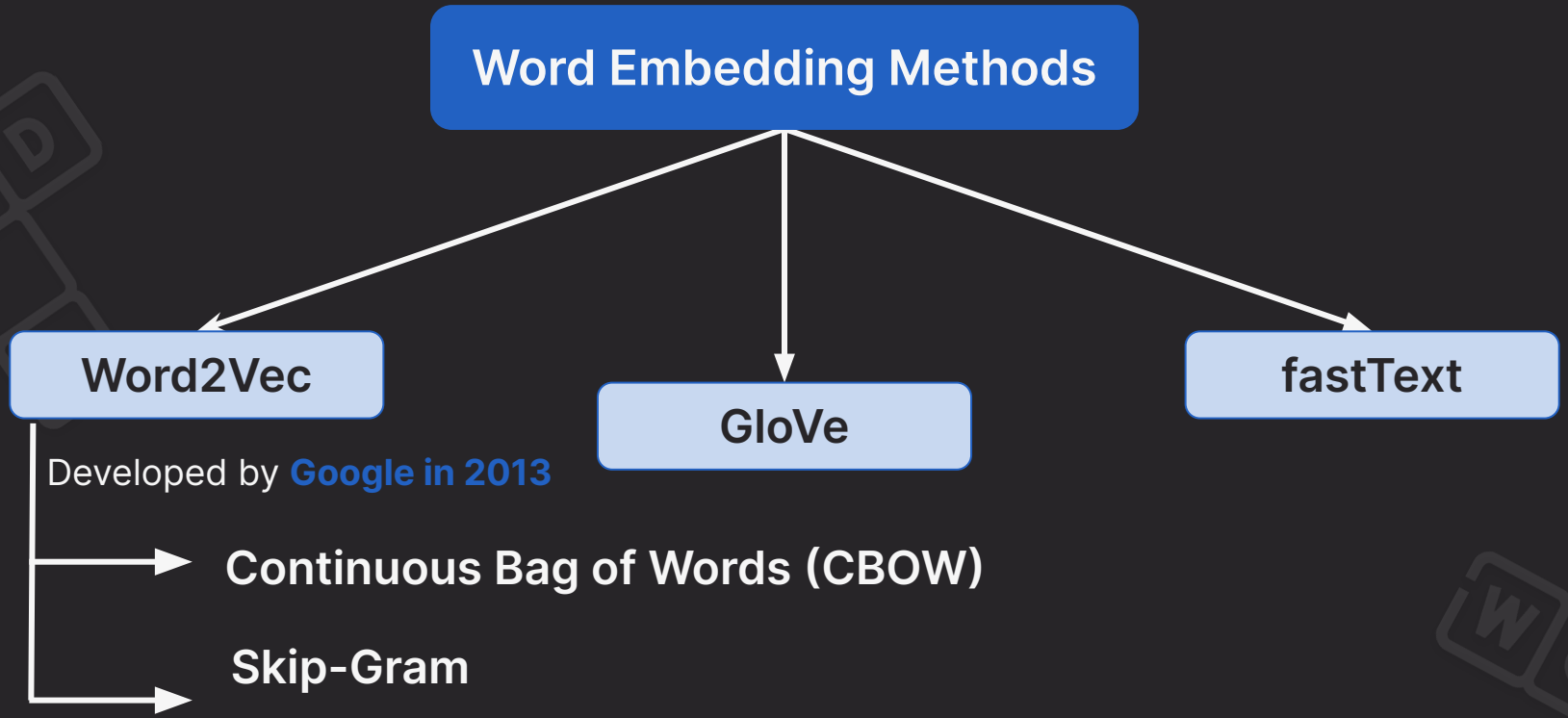




Word Embedding



Word Embedding



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Continuous Bag of Words

"The CEO delivered a compelling presentation at the board meeting."

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Continuous Bag of Words

Takes **context words as input** and predicts the most likely outcome or word to complete the missing part of sentence.

"The CEO **delivered** a **compelling** _____ at the **board meeting**."

presentation

speech

idea

thought

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Continuous Bag of Words

"The CEO **delivered** a **compelling** _____ at the **board meeting**."

Input	Target
delivered	presentation
compelling	presentation
board meeting	presentation

presentation speech idea thought

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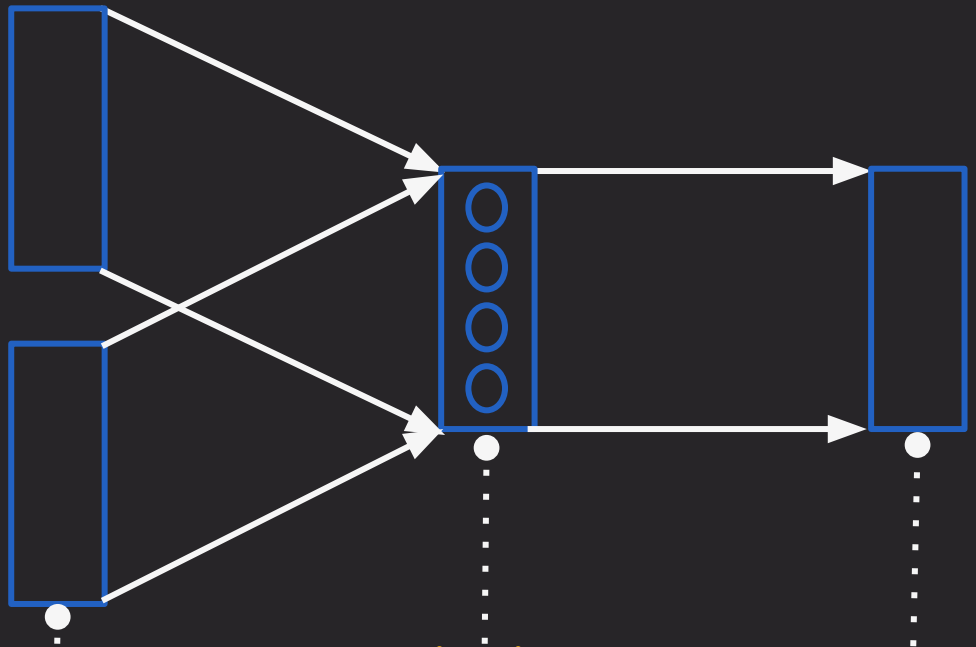
Continuous Bag of Words Model



Input Layer
Context words

Projection Layer
Word embeddings

Output Layer
Predict the target word

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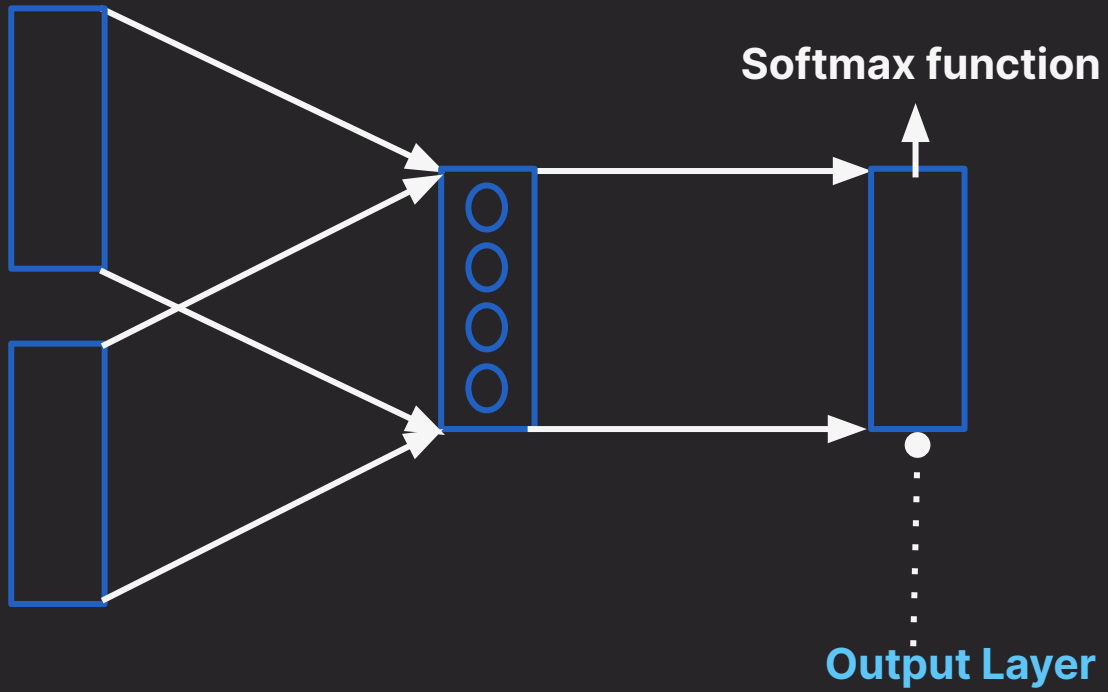
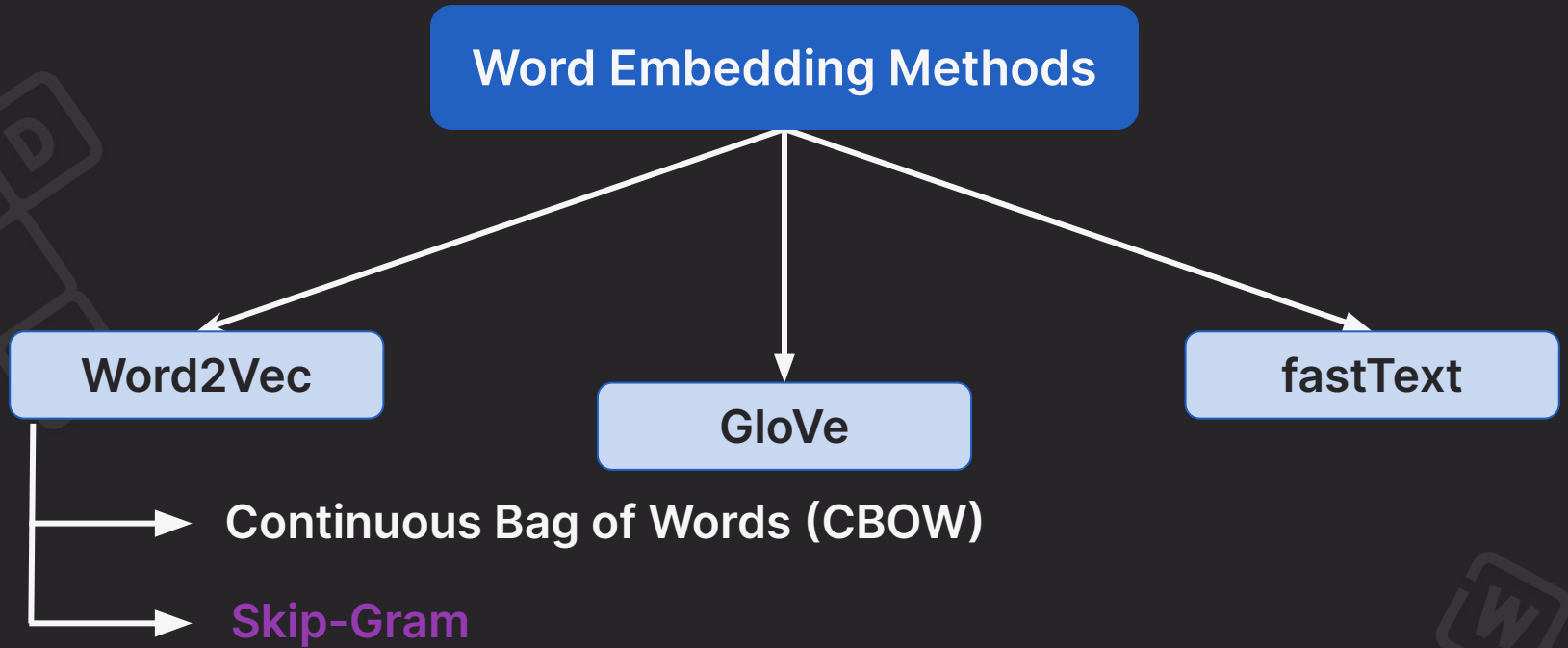
Continuous Bag of Words Model



Word Embedding



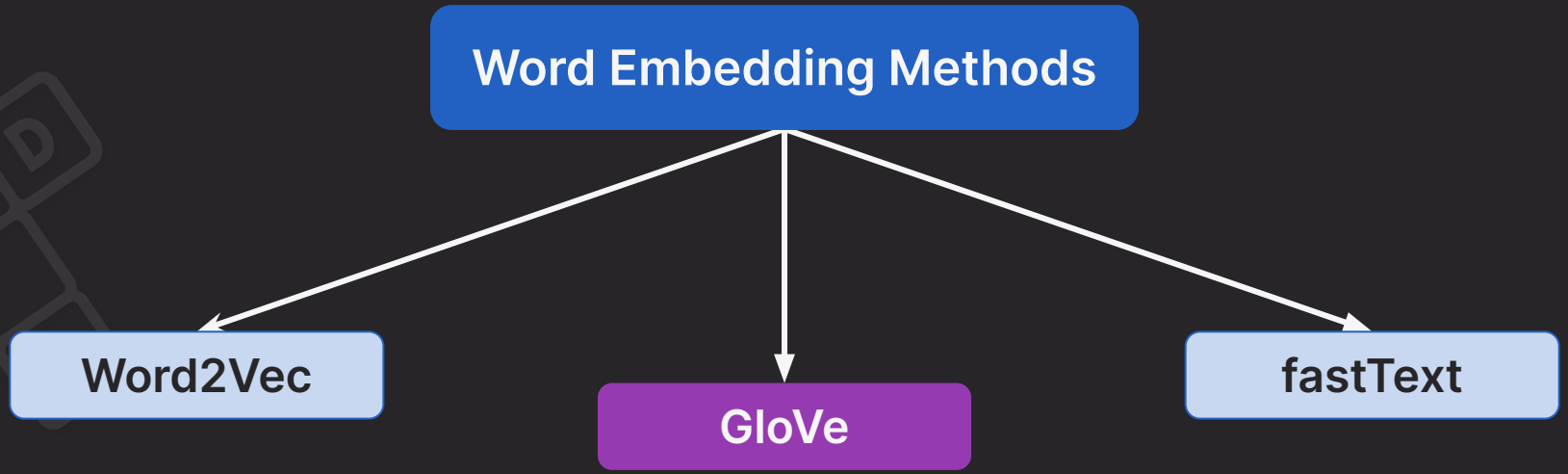
Skip-Gram

Starts with a target word and uses it to predict the surrounding context words.

"The CEO delivered a compelling **presentation** at the board meeting."

Input	Target
presentation	delivered
presentation	compelling
presentation	board meeting

Word Embedding



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2. GloVe

- Stands for Global Vectors.
- Developed by **Stanford University researchers**.
- Analyzes frequency of words and assigns similar numerical vectors.

2. GloVe : Building the Co-occurrence Matrix

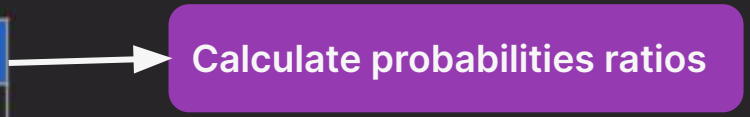
"The CEO delivered compelling presentation at the board meeting."

Window size = 1

	CEO	delivered	compelling	presentation	board
CEO	0	1	0	0	0
delivered	1	0	1	0	0
compelling	0	1	0	1	0
presentation	0	0	1	0	0
board	0	0	0	0	0

2. GloVe

	CEO	delivered	compelling	presentation	board
CEO	0	1	0	0	0
delivered	1	0	1	0	0
compelling	0	1	0	1	0
presentation	0	0	1	0	0
board	0	0	0	0	0



2. GloVe

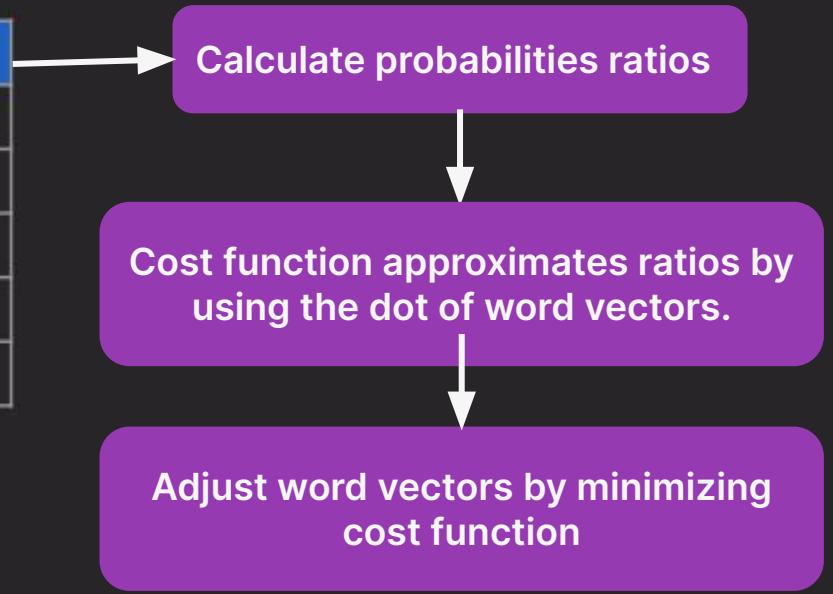
	CEO	delivered	compelling	presentation	board
CEO	0	1	0	0	0
delivered	1	0	1	0	0
compelling	0	1	0	1	0
presentation	0	0	1	0	0
board	0	0	0	0	0

Calculate probabilities ratios

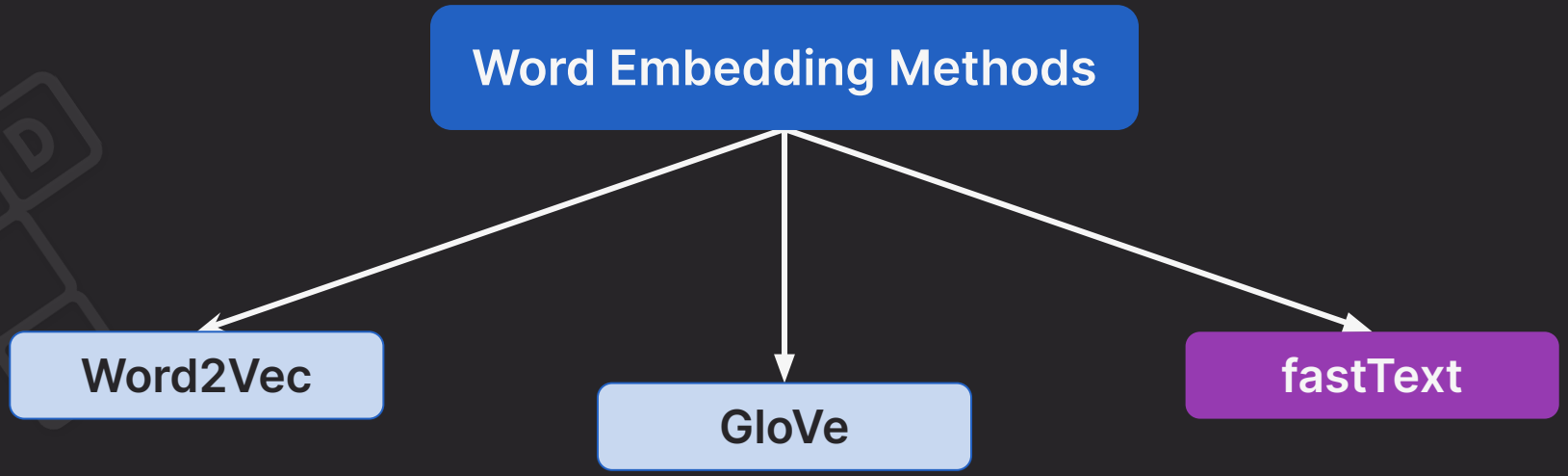
Cost function approximates ratios by using the dot of word vectors.

2. GloVe

	CEO	delivered	compelling	presentation	board
CEO	0	1	0	0	0
delivered	1	0	1	0	0
compelling	0	1	0	1	0
presentation	0	0	1	0	0
board	0	0	0	0	0



Word Embedding



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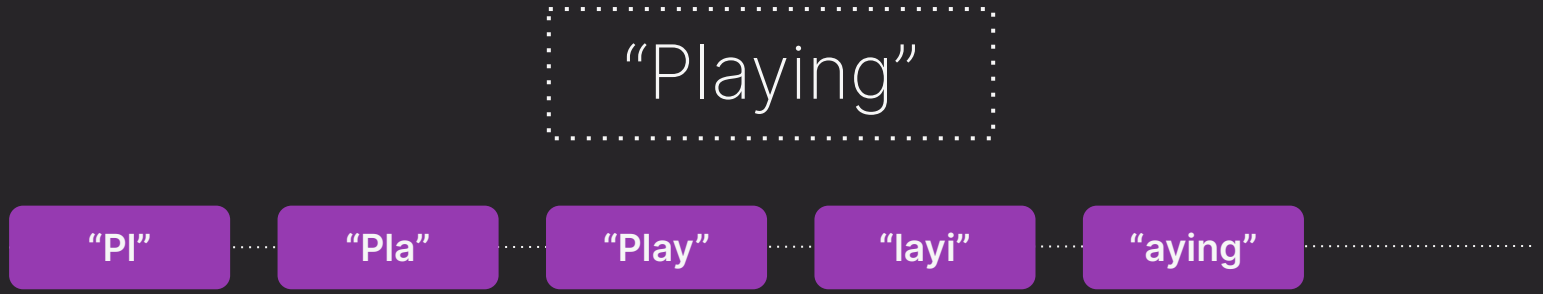
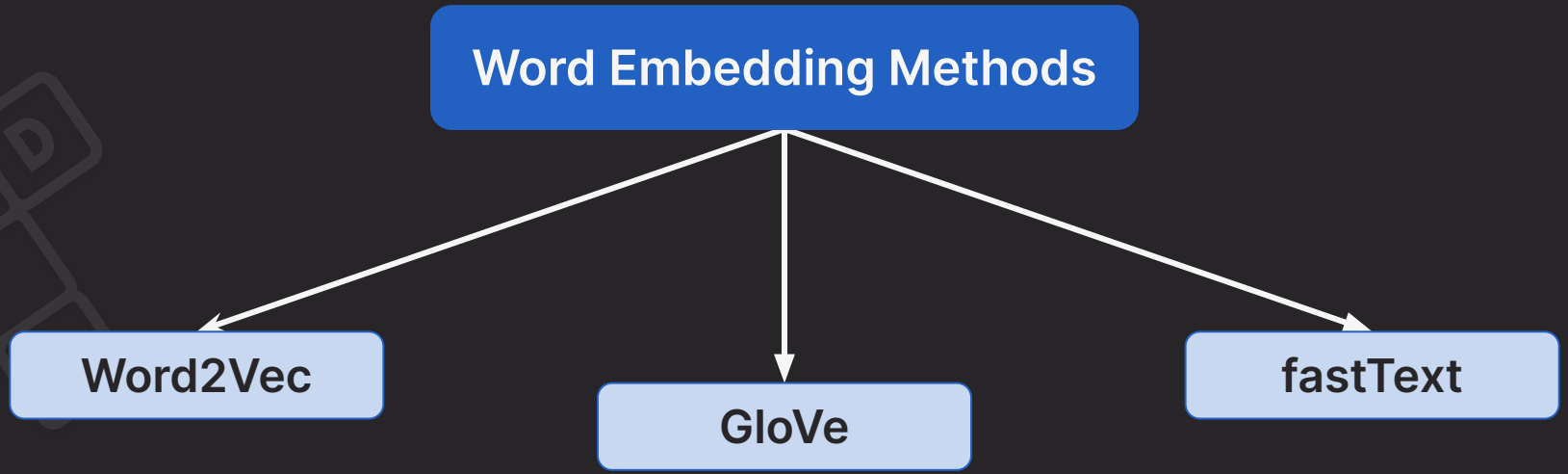
3. fastText

Developed by **Google in 2015**

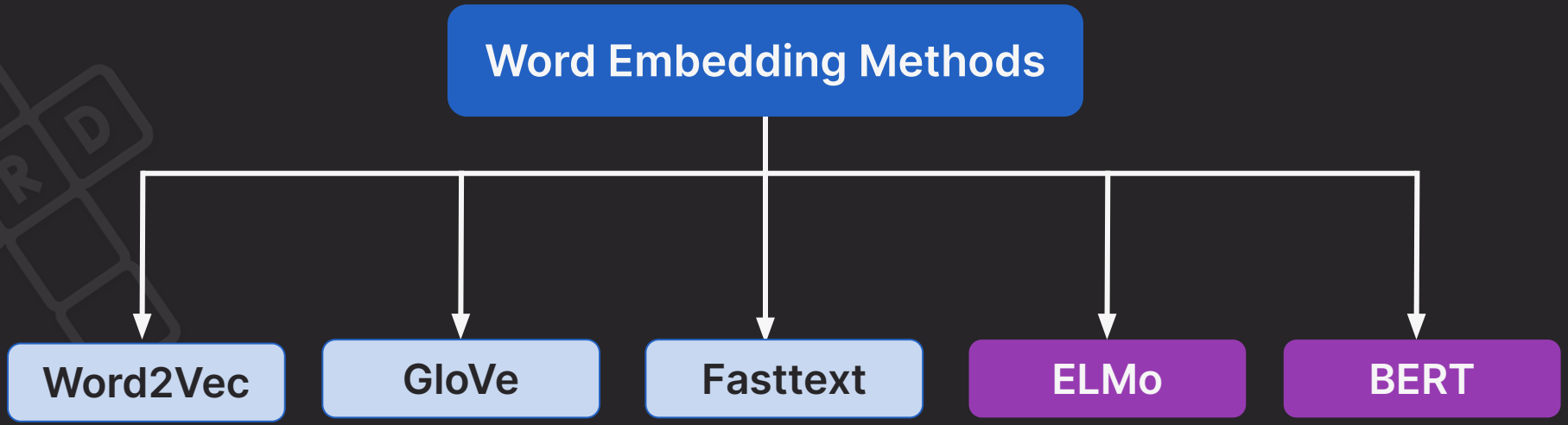
- Enhances word embeddings by using sub-word units like n-grams of characters within words.
- Extends the Word2Vec model to handle rare, new, or misspelled words.



Word Embedding



Word Embedding



4. ELMo

Embedding from language models

- Uses bi-directional LSTM models
- Pre-trained on large corpus to predict next word based on previous and future words.

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5. BERT

Bidirectional Encoder Representations from Transformers

- Consider both left and right context of words in a sentence.
- Uses Transformer architecture

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Up Next: RNN Model in Jupyter