DISCUSSION: WHATEVER IT TAKES TO UNDERSTAND A CENTRAL BANK - EMBEDDING THEIR WORDS USING NEURAL NETWORKS

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Overview

Summary

This paper:

- Presents a language model for quantifying text on central bank communication.
- Uses 23,000 central bank communication documents from over 130 central banks.
- Provides four different applications of the model.
- ⋆ Brings an impressive methodological contribution to text analysis on central bank communication.

Methodology

Model

⇒ Embedding is based on the understanding that the meaning of a word depends on the environment in which the word appears, surrounding words, and the overall context.

Table 2: Model Overview

Model	Word	Document	Corpus
Word2Vec Skipgram	x		CB corpus
Word2Vec BOW	x		CB corpus
Word2Vec Le and Mikolov (2014)	x		Google News
GloVe	x		CB corpus
GloVe Pennington et al. (2014)	x		Wikipedia/Gigaword
Doc2Vec D-BOW	x	x	CB corpus
Doc2Vec D-BOW Pre	x	x	CB corpus
Doc2Vec DM	x	x	CB corpus
Doc2Vec DM Pre	x	x	CB corpus
LDA	x	x	CB corpus

Note: The columns 'Word' and 'Document' refer to the model language model's ability to generate word- and document-embeddings and 'CB' is used as an abbreviation for 'Central Bank'.

Model Evaluation

Extrinsic evaluation

⇒ Embeddings from each model are classified using two ML techniques, K-Nearest-Neighbor(KNN) and random forest on the task of predicting each speech's central bank and publication year.

⋆ Winner: *Doc2Vec* at the document level.

Intrinsic evaluation

⇒ Using cosine similarity metric :

- ✓ Find most similar words to the relevant words used by central banks (e.g. unemployment).
- ✓ Estimate similarity of central banks at the document level.

Applications

Application 1

Similarity to the ECB increases when countries adopt an inflation target.

Application 2

When uncertainty is high, Draghi's speech and other similar speeches to his, lower the spread of government bonds.

Application 3

Male and female pronouns are associated with different profession.

Application 4

Explores the relation between speech embedings and different policy shocks.

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$\Rightarrow$ What is the purpose of the intrinsic evaluation?

- ✓ Wouldn't embeddings of any model when evaluated on cosine similarity produce some results of similarity between banks - when do you say the result is wrong?
- ✓ How about using different metric - euclidean distance?

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⇒ Application 3: On what data did the model produce embeddings of professions and pronouns?

- ✓ This exercise uses word embeddings, the most accurate model was the model on document level, does this have any implications?