Electoral Reform and Pork Barrel

in Parliamentary Questions

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Overview

- **Motivation:**
  - How does the electoral reform change legislators' preference and their intentions to bring home the bacon?
- **Theoretical Expectation:**
  - Scholars have clearly explained why intraparty competition by different rules of electoral systems increases legislators' incentives to run on a personal reputation
  - We however know little about whether actual impacts introduced by the electoral reform through MMD (Multi-members District) to SMD (Single-member District) reduce legislators' motives to pursue pork barrel project in the legislature.
- **Data and Method:**
  - I train deep learning models using Convolutional Neural Networks on top of embedding layer extracted from *Transformer BERT* to evaluate pork-barrel activities in parliamentary questions.
  - Approximately 150,000 PQs since 1993
- **Major Finding:**
  - Evidence exists to show that legislators under MMD are more likely to express political intention about pork-barrel projects in written parliamentary questions.
  - The reform have heterogeneous impacts on mainstream parties vis-à-vis small parties.

Why Parliarmentary Questions

Legislaive activities such as ***legislative votings***, ***debates*** (*e.g, ParSpeech V2*) and ***parliamentary questions*** (*e.g, LACAN*) play a significant role in most democracies.

> **Roll Calls**: Legislative votings are generally dominent by party
>
> - *Slapin et. al (2018): Politicians grandstand strategically against party in the British Parliament*
> - *Park (2021): in US House committee Hearings*
>
> **Debates**: MPs are not equally access to floor speech

The advantages of using the PQs:

> ***comprehensive***, ***accessible***, and ***rich***
>
> The party leadership have less control over MP's motivation to employ parliamentary questions *(Shane 2011)*.
>
> Parliamentary questions may reveal MPs' interests in policy preference (Shane 2011; Saalfeld 2011).

Why Parliarmentary Questions

MPs ask questions for several reasons:

- Because of their **expertise** or domain responsibility of delegation for question topics.
- Personal preference such as their nature of **substantive representation** *(Russo 2021; Saalfeld 2011; Martin 2011)*
- Electoral motivation: **personal reputation** (Martin 2011)

Implication

In this paper:

- I introduce the case of **Taiwan Legislative Yuan**, where the electoral system reformed through SNTV to SMD, to evaluate how electoral motives shape legislators' tendency to pork-barrel projects under different electoral systems.
- Parliamentary questions are the primary channel for legislators to **scrutinize the government** and **express political intentions**.
- These parliamentary questions allow identification of different ***question topics***, ***categories*** and further information regarding ***legislators' opinions of policy interests and agenda at the individual level***.

Electoral Reform in Taiwan:

- The SNTV-MMD was the major system to elect legislators before 2008 in Taiwan.
- This was thought to intensify majority-seeking parties to run more than one candidate in a district, which increases incentives for candidates to run on personal votes against their party reputation (Cox 1990; Carey and Shugart 1995).
- The SNTV in Taiwan was criticized for creating **excessive intra-party chaos and competition** (Cox 1990; Hirano 2006; Ames 2001), as well as **encouraging factional and candidate-centered electoral politics** (e.g. Batto and Huang 2016; Wu 2003).

Theoretical Expectation:

- Under SNTV, co-partisan candidates cannot rely exclusively on their party reputation and have to find an alternative means of attracting votes by **running on a personal reputation** via **providing paricularistic services** (Cain, Ferejohn, and Fiorina 1987; Reed 1994; Carey and Shugart 1995).
- Luor and Liao (2009) finds that the more pork-barrel legislation legislators propose, the higher grant allocation the municipalities (districts) receive.
- Catalinac (2016) finds that LDP (Liberal Democratic Party) candidates under the SMDs in Japan adopted new electoral strategies by mentioning programmatic policies such as national security.

Hypothesis:

> *Hypothese I: Under the SNTV-MMD, legislators are more likely to propose the questions regarding the provision of particularistic goods.*
>
> *Hypothese II: Under the SMD-MMM, legislators are more like to ask the questions related to programmatic and regulatory policies*

Research Design

Training Deep Learning Model:

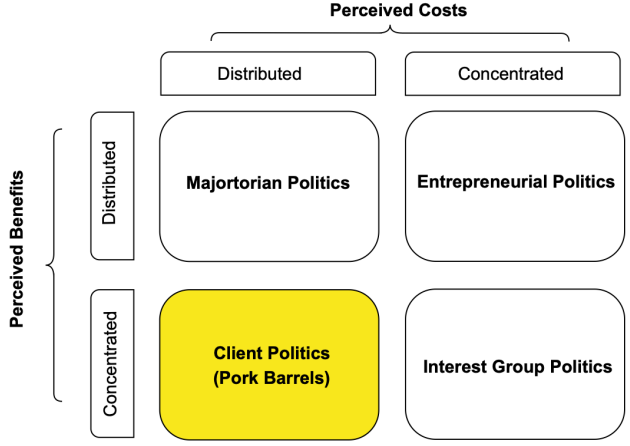
> Existing labelled pork legislation from 2007 to 2008
>
> Train a machine to identify pork-barrel features on parliamentary questions over time.

Regression Analysis:

> Regression analyses are employed to answer the research questions.
>
> Control for the effects from legislators and municipalities across the years.

Training Data: Pork-barrel Legislation

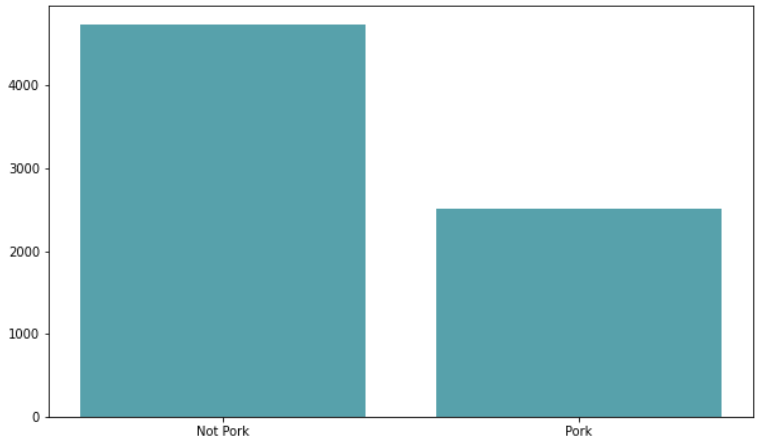
- The gold standard for identifying the pork-barrel legislation is based on the target beneficiaries of the policy (distributed vs concentrated) and attributes of policy cost (distributed vs concentrated).
- Typical pork-barrel policies (or legislation) mainly incur distributed costs while generating parochial benefits for ***specific regions*** or ***designated population groups***.



Training Data

Number of Train/ Test Sets

- The collection of this data set consists of ***7243 pieces of legislation*** which were annotated as ***Pork*** or ***Non-Pork***.

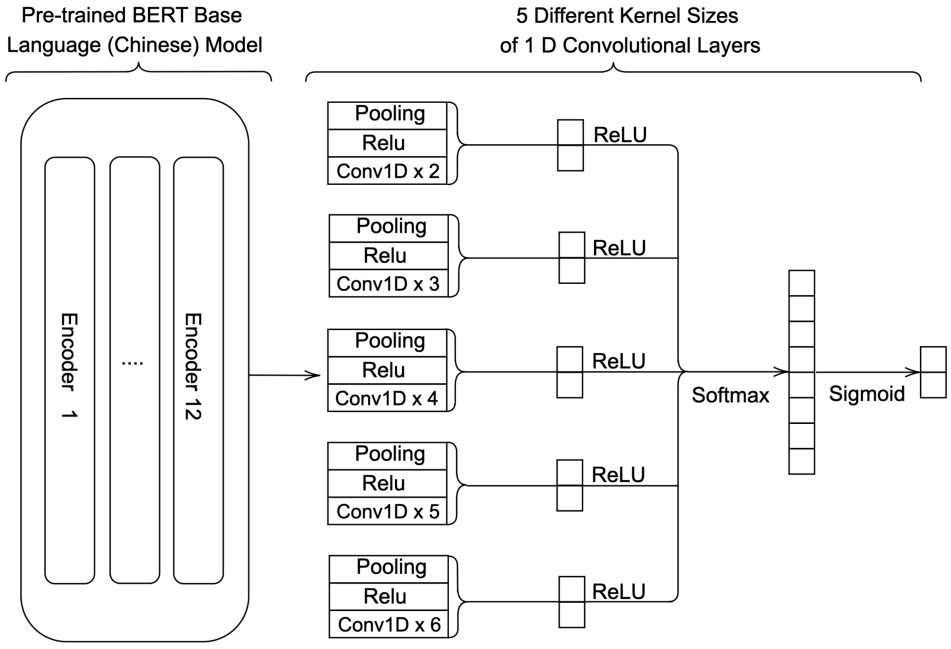


- This dataset was cross-coded by three social science researchers to perform its validity, which achieves 98% in terms of consistency and preciseness among coders (Luor and Hsieh 2008; Luor and Liao 2009).

BERT Layers + Convolutional Neural Nets

Strength

> self-attention mechanism
>
> dealing with ***unseen words***, particularily in Chinese (unspaced language).



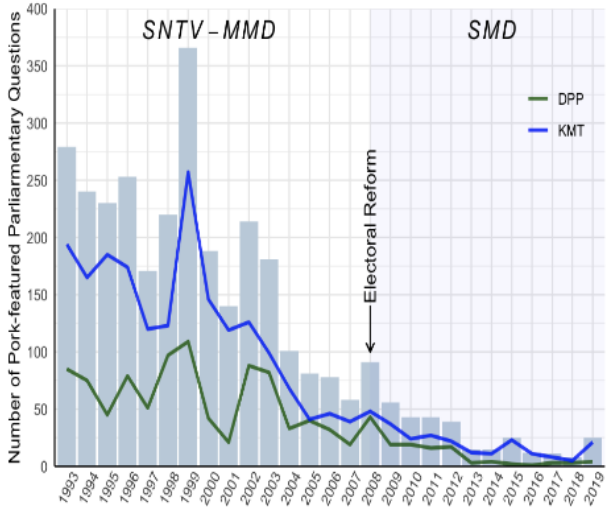
Pork Featured Questions

Legislator	Questions	Topics	Keywords
陳啟昱	鑑於現行《所得稅法》第十	Income tax; education expenses; deductions	Special Deductions; Educational ***Expenditure***
彭添富	針對「辦理九十四年原住民	Aboriginal life	housing ***subsidies***
李復興	發現自九十三年一月間起	labor retirement ***benefits***	Retired employees .ul.hi-grey[*allowance*] for the elderly
盧秀燕	針對早期退除役軍官給與補	Veterans welfare	***Grants*** for early retired officers
丁守中	針就民眾陳情指出，目前政	Welfare for the handicapped	Living ***allowance***
馮定國	鑒於國內經濟結構的快速	Elderly ***welfare***	Aging; middle and old age unemployment
彭添富	針對「豪雨成災，	Agricultural ***subsidies***	Heavy rain; crops
曾華德	為民國38年至43年間戍	Military ***pay***	Anti-Communist Salvation Army Reimbursement of Salary

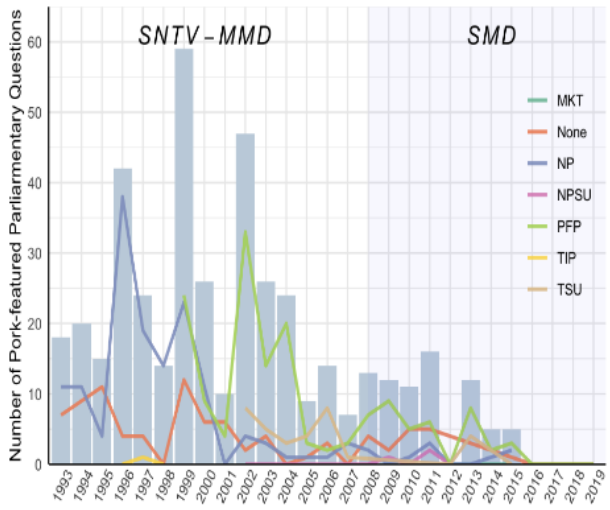
Less-pork Featured Questions

Legislator	Questions	Topics	Keywords
李復甸	鑑於刑事偵察實務上緩起	Investigation; litigation procedure	***Criminal investigation*** ; secret witness
林建榮	為立法院朝野協商修改銀	Financial management; bank management	***Banking Law***; Cash Card; Revolving Interest Rate
林正峰	針對行政院長張俊雄日前	Energy policy	Energy saving
林正峰	鑑於近年來臺灣地區毒品	Tobacco Restriction; Hospital	***Drug Abuse***; Departmental Hospital
王幸男	針對道路人孔蓋或管線挖	Public Safety	Manhole cover; ***public safety***; road quality
管碧玲	針對近日台灣鐵路管理局	Railway management; ticket	***Online booking***; monopoly; Taiwan Railway
黃敏惠	就近日來爆發知名提神飲	Drinks; Poisoning	Drinks; Poisoning, ***Poisoning***
陳朝龍	針對英國政府宣稱台灣出	Infectious disease prevention and control	British Government; Taiwanese birds; Avian Influenza ***Avian Influenza***

Tentative Findings



(a) Major Parties: KMT and DPP



(b) Minority Parties: Others

Figure 5: The Number of Pork Barrel Question By Years

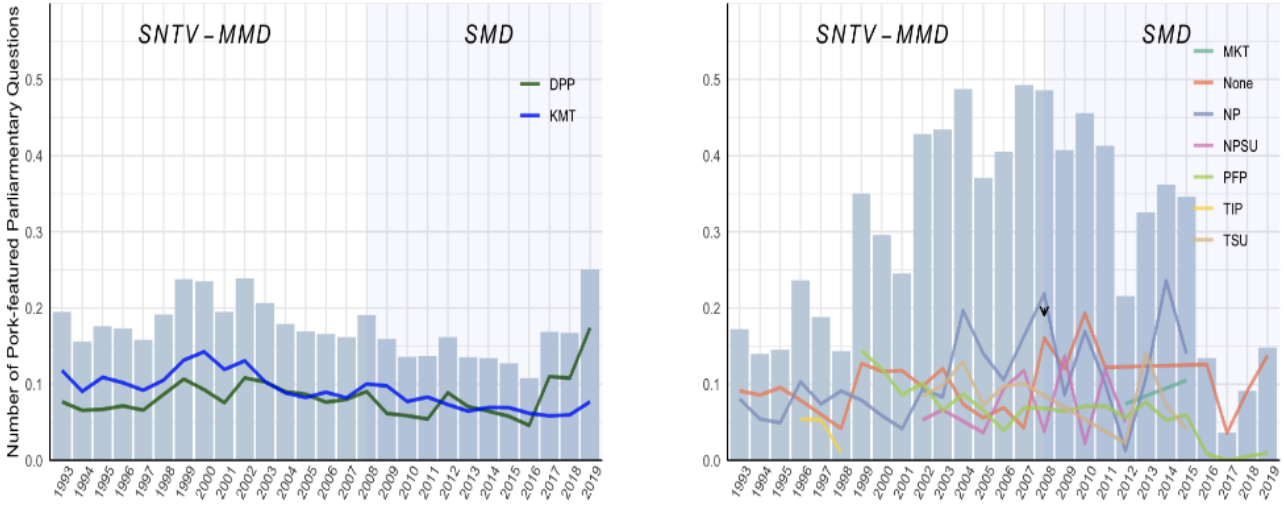
Tentative Findings

Table 3: Regression Analysis for District-level Pork-barrel Parliamentary Questions by Quarter-yearly

	Full Model		Major Parties		Minority Parties	
	Integration	(+Controls)	Integration	(+Controls)	Integration	(+Controls)
Reform	-14.052***	-13.125***	-14.959***	-16.346***	-11.180	4.954
	(3.946)	(5.085)	(4.173)	(5.569)	(8.365)	(19.928)
Year	-.006***	-.006***	-.006***	-.008***	-.002	-.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Reform x Year	.006***	.006***	.007***	.008***	.005	-.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.004)	(0.009)
Constant	12.610***	12.713***	13.732***	16.206***	5.091	2.712
	(2.129)	(2.735)	(2.408)	(3.672)	(5.614)	(6.546)
District Fixed Effects		✓		✓		✓
Legislator Fixed Effects		✓		✓		✓
The Reform Year	✓	✓	✓	✓	✓	✓
Observations	4,252	4,252	3,539	3,539	713	713
Adjusted R^2	0.016	0.218	0.020	0.233	0.003	0.179

Note: * $p < 0.10$,** $p < 0.05$, *** $p < 0.01$. Robust standard errors in parentheses. The district-level pork-barrel parliamentary question at quarter-yearly is regressed on year, electoral reform, and interaction between year and electoral reform, with and without controls. Controls include fixed effects for electoral districts, municipalities, and individual legislators and the occurrence of the reform.

Tentative Findings



(a) Major Parties: KMT and DPP

(b) Minority Parties: Others

Figure 6: The Average Number of Pork Barrel Question By Years

Takeaway

Takeaway

- Evidence exists to show that legislators under SNTV are more likely to ask pork-barrel projects in the questions.
- The reform demonstrates heterogeneous effects on major parties vis-à-vis the minority parties

The Limitation:

> **Training Data**: The pork barrel legislation from training data used in this paper has been nearly ten years. The deep learning classifier might fail to capture unknown/undeve concepts developed in the post-reform period.
>
> **Social Media?**: A steady decrease in the total number of PQs since 2003

Thank You

Table of the Appendix

Supplementary

An Example of Parliamentary | The Number of Parliamentary Question | The Performance of the Models

Embedding Types

One-hot Encoding | Static Embedding Vectors | Contexted-based BERT Embedding | One-hot vs Embedding Representation

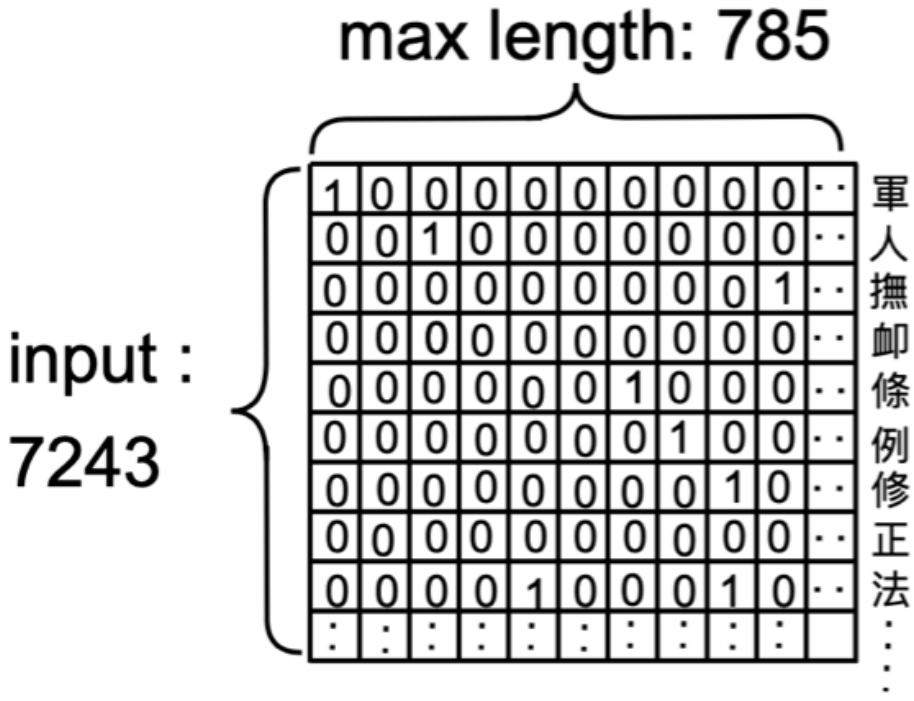
Miscellaneous

TensorBoard of PorkCNNBERT | legisCrawler: An Toolkit for Retrieving Taiwan Parliamentary Questions

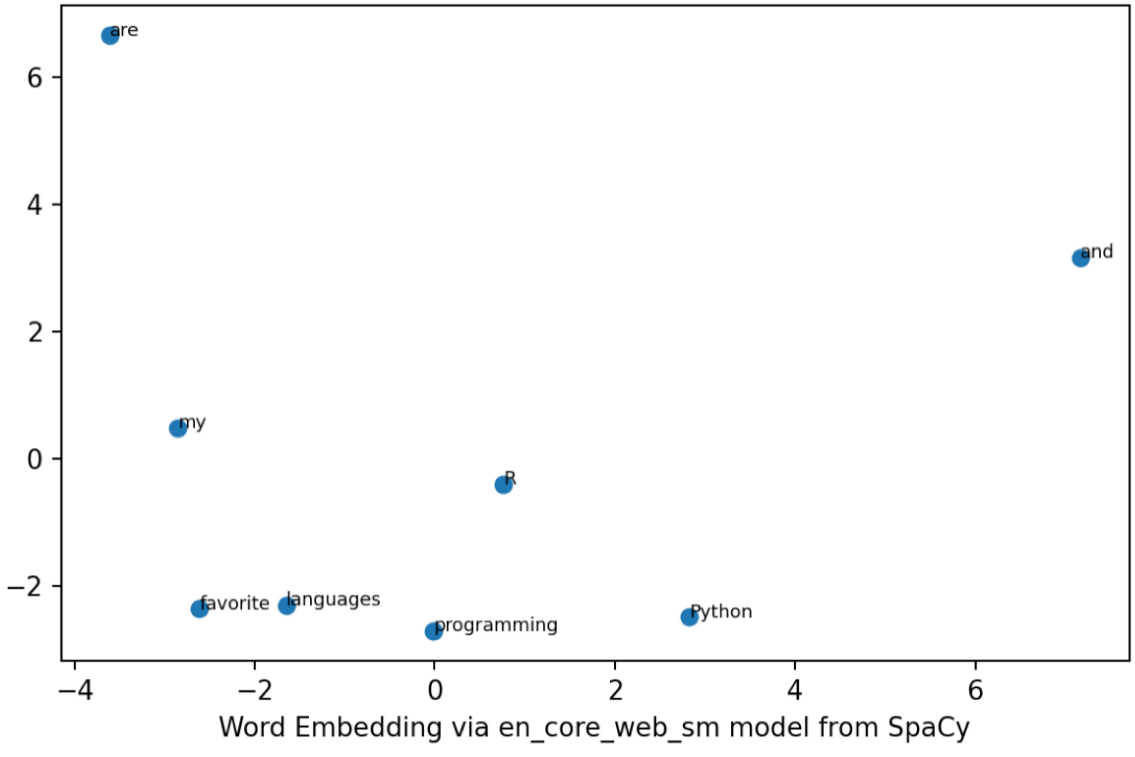
Parliarmentary Questions

- In order to analyze parliamentary questions, I have webscraped the parliamentary questions from the official website of Taiwan Legislative Yuan from 1993 to 2020, including the relevant information about ***the classified topics***, ***selected keywords*** and the corresponding ***question type***.

One-hot Encoding



Static Embedding Vectors

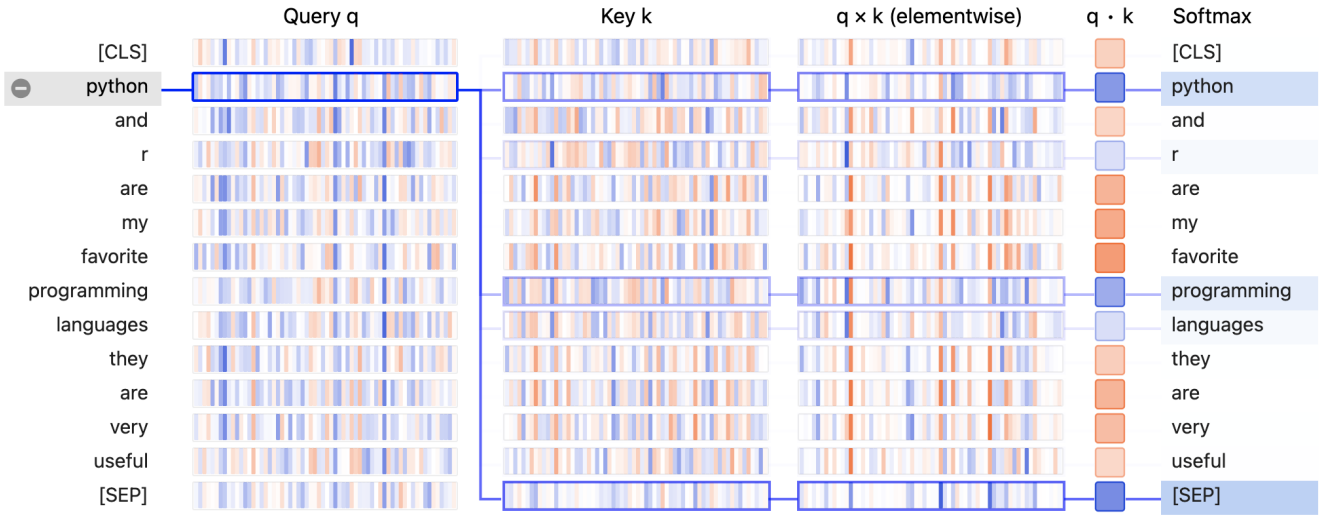


Static Embedding Vectors

```
nlp = spacy.load("en_core_web_sm")
vocab = nlp("R and Python are my favorite programming languages")
words = [word.text for word in vocab]
vecs = np.vstack([word.vector for word in vocab if word.has_vector])
pca = PCA(n_components=2)
vecs_transformed = pca.fit_transform(vecs)
```

```
plt.figure(figsize=(10, 7))
plt.scatter(vecs_transformed[:,0], vecs_transformed[:,1])
for word, coord in zip(words, vecs_transformed):
  x, y = coord
  plt.text(x, y, word, size=7)
plt.xlabel("Word Embedding via en_core_web_sm model from SpaCy")
plt.show()
```

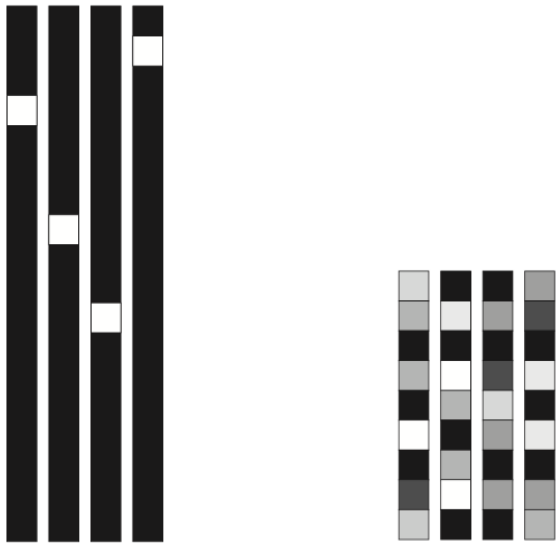
Contexted-based BERT Embedding



Contexted-based BERT Embedding

```
from transformers import AutoTokenizer
from bertviz.transformers_neuron_view import BertModel
from bertviz.neuron_view import show
tokenizer = AutoTokenizer.from_pretrained("bert-base-uncased")
model = BertModel.from_pretrained("bert-base-uncased")
text = "R and Python are my favorite programming languages [SEP] Python is a snake"
show(model, "bert", tokenizer, text, display_mode="light", layer=0, head=8)
```

One-hot vs Embedding Representation



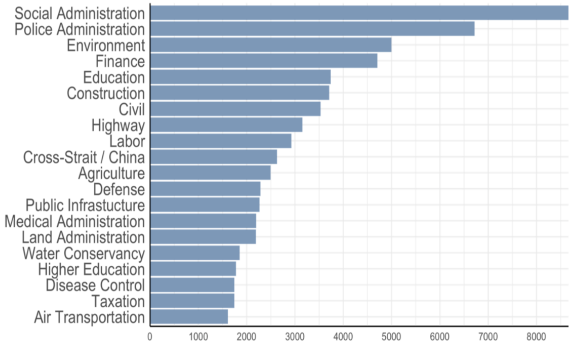
Source:Deep Learning with Python 2019, p151

The Performance of CNN, BERT and CNN-BERT

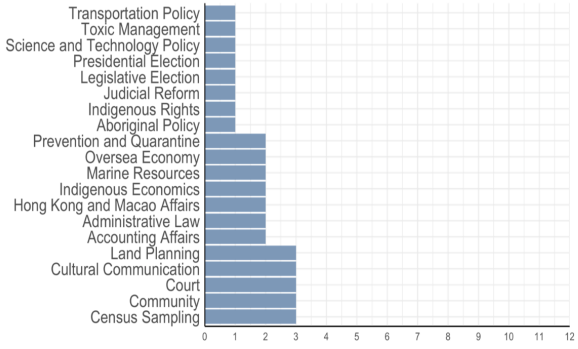
Table 5: The Performance of CNN, BERT and CNN-BERT

	TextCNN			BERT			CNN-BERT		
	Precision	Recall	F1-score	Precision	Recall	F1-score	Precision	Recall	F1-score
Non Pork	0.95	0.97	0.96	0.96	0.97	0.97	0.96	0.97	0.97
Pork	0.94	0.91	0.92	0.95	0.93	0.94	0.95	0.93	0.95
Accuracy			0.95	0.96		0.96			0.96
Macro Avg	0.95	0.94	0.94	0.96	0.95	0.95	0.95	0.94	0.94
Weighted avg.	0.95	0.95	0.95	0.96	0.96	0.96	0.95	0.95	0.95

The Distribution of Parliamentary Questions Categories



(a) Tops 20 Most Frequent Categories



(b) Top 20 Less Frequent Categories

Figure 2: The Distribution of Parliamentary Questions Categories Asked by Legislators

The Number of Parliamentary Questions from 1993 to 2019

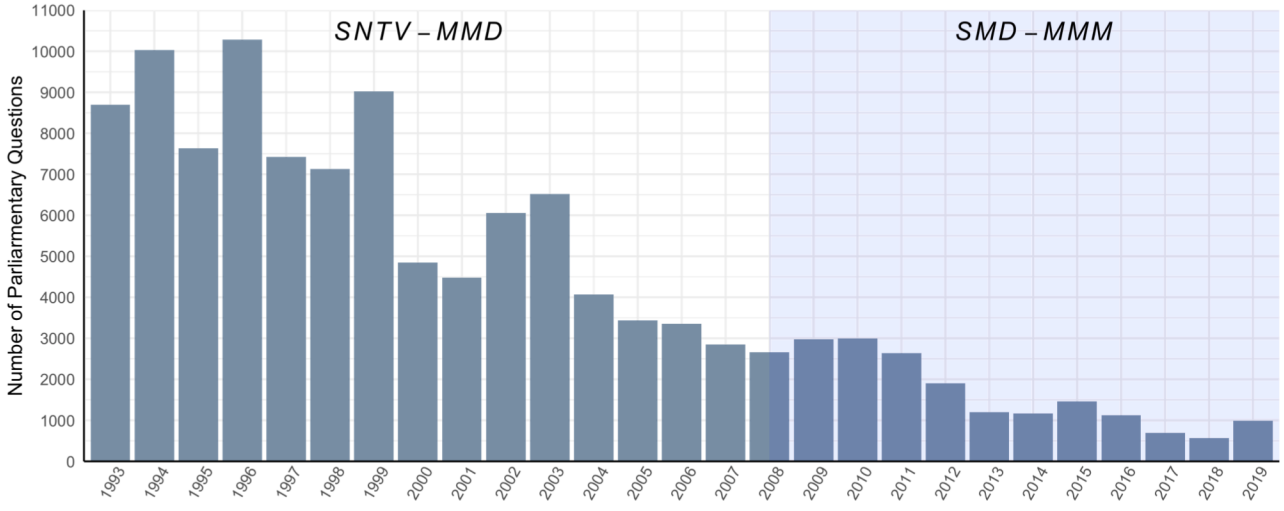


Figure 1: The Number of Parliamentary Questions from 1993 to 2019