

# Electoral Incentives and Porks

## Exploring Parliamentary Questions Using Convolutional Neural Networks

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Paper III / PhD Dissertation Project in Progress

# Research Questions

- In this paper, we quantitatively investigate legislators' electoral strategies and communication style by applying a deep learning model to measure pork-barrel features on **parliamentary questions** in Taiwan Legislative Yuan.
- Research Questions:
  1. Are the legislators in the SNTV-MMD (single non-transferable vote in multi-member districts) more likely to bring home the bacon by promising the provision of particularistic goods?
  2. Does the switch of electoral system from the SNTV to the SMDs (single member districts) reduce legislators' incentives to cultivate a personal reputation by paying less attention to distributive (pork barrel) policies?
  3. Dose it change legislator electoral strategies by increasing more attention to universalism policies such as regulatory policies?

# Background

- 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. Given this, candidates were competing with competitors from not only opponent parties, but the same party as well.
- The SNTV-MMD in Taiwan has been 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).
- Therefore, some East-Asian democracies in 1990s such as Japan, South Korea and Taiwan started to reform the electoral system by changing SNTV-MMD to single-member districts (SMD-MMM).

# The Literature: Personal Votes

- The electoral system such as SNTV-MMD, which combines plurality rule with a single vote per voter and a district magnitude larger than one, was believed to **increase intra-party (centrifugal) competition** (Cox 1990; Carey and Shugart 1995).
- Under the SNTV-MMD, parties or party leaders have incentive to nominate more than one candidate to run in each district, which required their **candidates to compete against each other**.
- Therefore, 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 particularistic services as called “personal vote” (Cain, Ferejohn, and Fiorina 1987; Reed 1994; Carey and Shugart 1995).

# The Literature: Pork Barrel Politics

- An examination of the relationship between electoral systems and the “pork-barrel” phenomenon is being investigated in light of the explosion of interest in the past decade in **the effects of different electoral systems** on policy outputs (e.g., Hirano 2005; Samuels 2002; Stratmann and Baur 2002; Lancaster and Patterson 1990; Lancaster 1986).
- The literature focusing on Taiwan distributive politics has investigated the effects of the electoral reform that **decreases legislators' incentive to bring home the bacon**.
- For example, Sheng (2014a) and Sheng (2014b) investigate the impacts of electoral reform on changes of bill sponsorship with regards to particularistic goods among legislators. Luor and Hsieh (2008) and Luor and Liao (2009) focus on the impact of district magnitude on legislators' incentive to propose pork barrel-related bills.

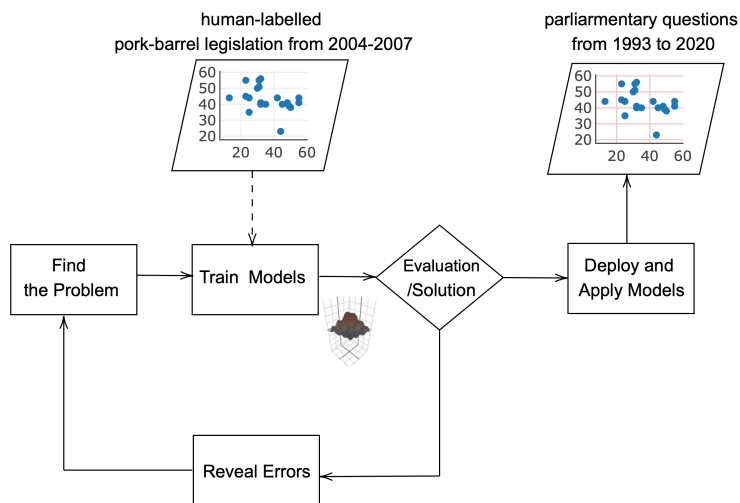
# The Literature: Pork Barrel Politics

- In similar, Catalinac (2016) finds that LDP (Liberal Democratic Party) candidates under the SMDs in Japan adopted new electoral strategies by providing programmatic policy benefits such as national security among other candidates affiliated with LDP party, **reducing promise of pork barrel goods** and intra-party competition.
- Given this the SNTV system, candidates were competing with competitors from not only opponent parties, but the same party as well. As results, candidates were incentivized to attract votes by **giving out more distributive benefits** to their own constituency, rather than nation-wide.
- Under the SNTV-MMD, candidates face the major **threat from co-partisan candidates** and therefore, are likely to seek personal votes by promising particularistic benefits for their sincere voters (Cain et al. 1987; Carey and Shugart 1995; Catalinac 2016).

# Research Design

## Training Deep Learning Model

- We have trained a convolutional neural network with TensorFlow 2.6 on the human-labelled pork-barrel legislation, including the bills and the amendments from Legislative Yuan.



- The collection of legislation was manually labelled with binary-instance classification by Dr. Ching-Jyuhn Luor and his research team at National Taipei University.

# Research Design

## Labeld Pork-barrel Legislation for Training the Model

- They have created **hand-labelled legislation** by reading the purpose of statute, devoted either to promoting the pork-barrel project (earmarked projects) in **a district** or cultivating favored **specific population groups** by providing subsidies such as agriculture allowance to the farmers ( Luor and Hsieh 2008; Luor and Liao 2009; Luor and Chan 2012).

立法院第6屆第5會期第6次會議議案關係文書

立法院議案關係文書 (中華民國41年9月起編號)  
中華民國96年3月28日印發

院總第 1687 號 委員提案第 7375 號

the purpose of statute

案由：本院委員林重謨、蔡啟芳、侯水盛、潘孟安、盧天麟、高建智、余政道、唐碧娥等 40 人，有鑒於最低基本工資可視為人民維持基本生活水準之意涵，現行每月僅有五千元之老年農民福利津貼相較於一萬五千八百四十元之法定基本工資，實已偏低，不但無法維持老年農民基本生活需求，亦與老年農民長期對國家的貢獻不成正比，更有違政府落實照顧農民的承諾，再加上近年來物價年年高漲，使老年農民生活的艱苦更加雪上加霜。職是之故，基於保障老年農民基本生活水準，肯定老年農民之貢獻並提昇其生活品質，特擬具「老年農民福利津貼暫行條例第四條修正案」，比照國內法定基本工資之標準，將現行老年農民福利津貼發放金額由每月五千元提高至每月一萬五千元。是否有當，敬請公決。

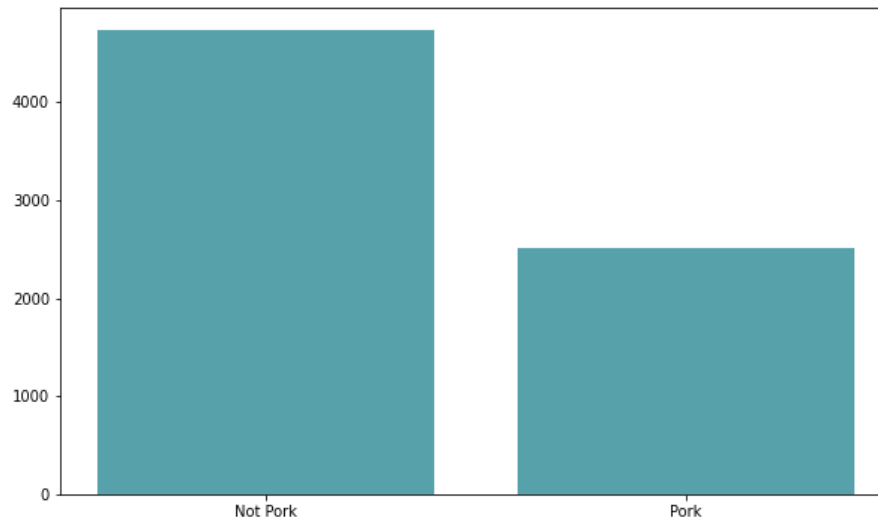
to NTD 15000



# Research Design

## Number of Train/ Test Splits

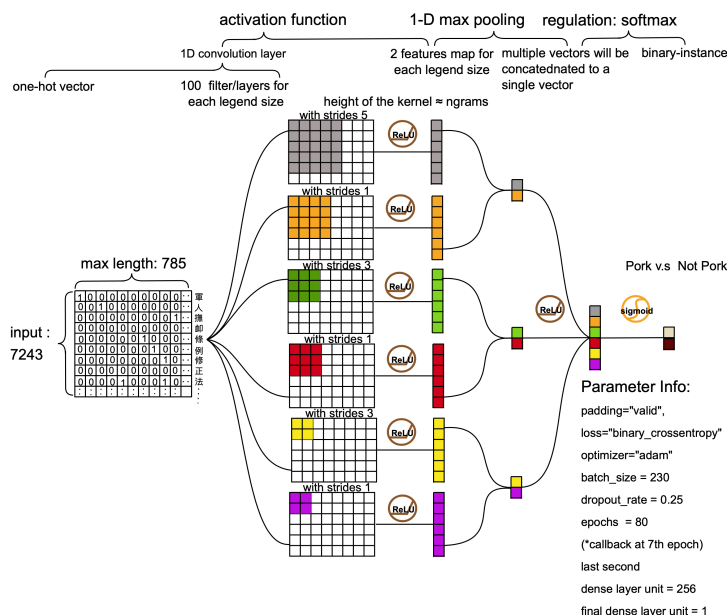
- The collection of training data consists of 7243 pieces of legislation in total and containing 4852 (Not Pork vs Pork: 3167, 1685) training sets and 2391 (Not Pork vs Pork: 1566, 825) test sets, respectively.



# Declaring the CNN Model

## Model and Building

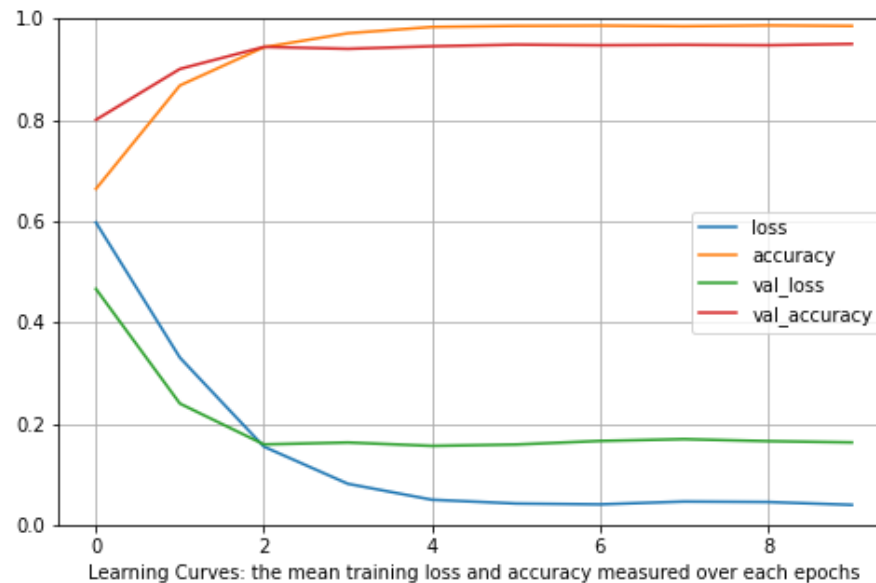
- The implementation of the CNN is similar to that described by Kim (2014), except that this paper does not apply word embedding model for tokenization.



- The actual graph in Tensorboard.

# Performance

- The mean training loss and accuracy measured over each epochs, and the validation loss and accuracy measured at the end of each.
- Show all learning curve history until 1000 epochs (see, [Tensorboard](#))



# Parliamentary Questions

- For exploration of parliamentary questions, I have web scraped the parliamentary questions and the speeches from The Website of Taiwan Legislative Yuan from 1993 to 2020, including categories of information with regards to the topic, keywords and the type.

丁守中 8 7 6 4 3 2 1 ALL

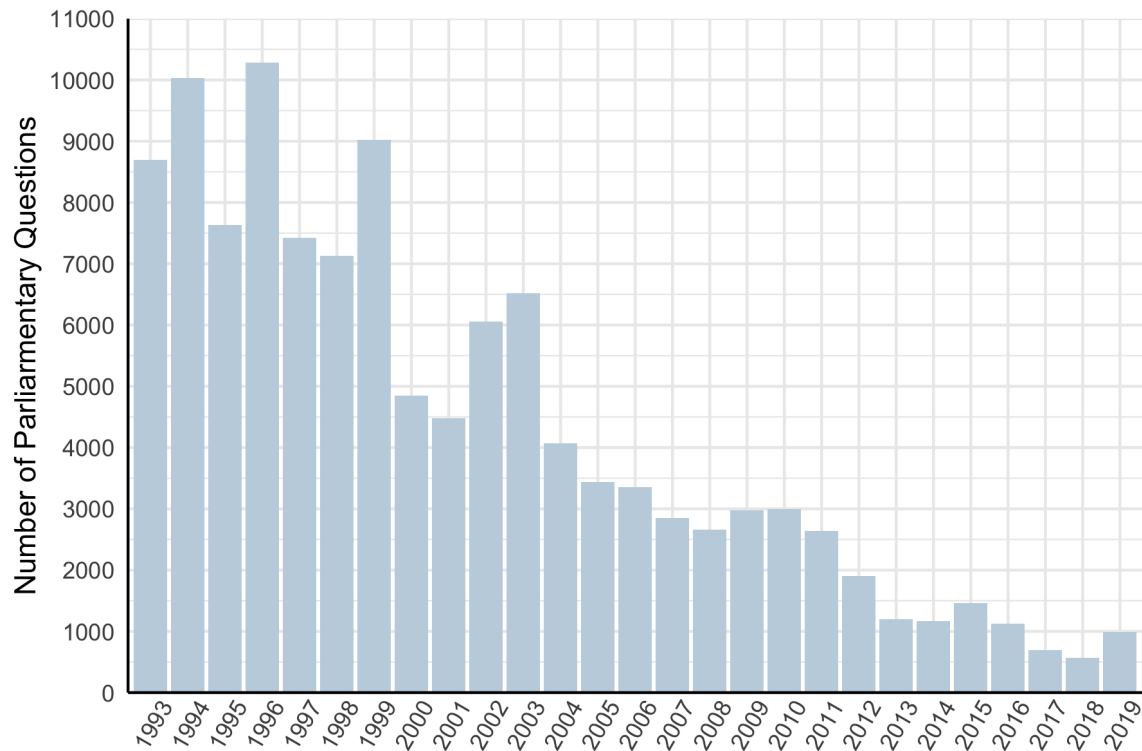
基本資料 問政成果

詳細資料 第1/366筆 回查詢 下一筆 列印 存檔

質詢委員	丁守中 legislator
質詢性質	預決算質詢 question type
質詢	立法院第7屆第7會期第12次會議 100年05月10日 100卷037期一冊3889號0341-0345頁
案由	行政院院長、主計長、財政部部長列席報告100年度中央政府總預算追加預算案編製經過，並備質詢。 the purpose
答復否	已答
答復	立法院第7屆第7會期第12次會議 100年05月10日 100卷037期一冊3889號0341-0345頁 口頭答復
答復人	吳敦義 李述德 吳清基
質詢日期	1000510 date
答復日期	1000510
系統號	205510
類別	營建；賦稅；教育政務；水利 categories
主題	房價；課稅；水資源；教育人員俸給 types
關鍵詞	土地增值稅；財產交易所得稅；奢侈稅；大專院校教授薪資；節水；廢水回收再利用；抗旱 Keywords

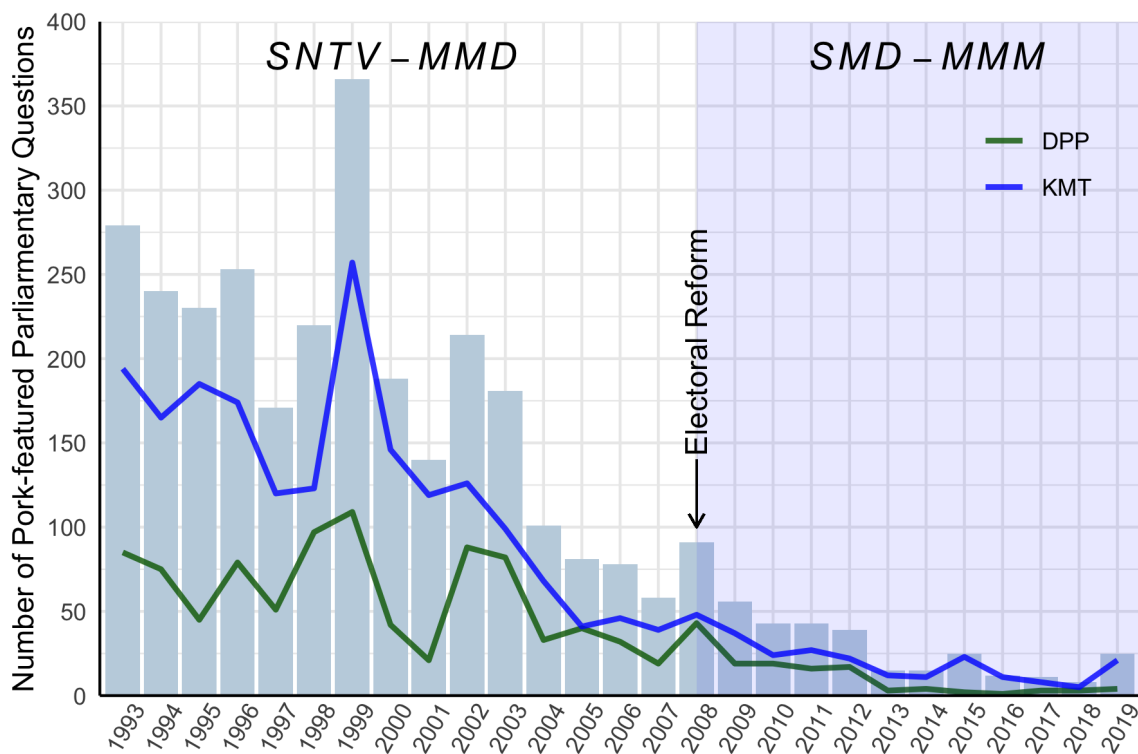
# Parliamentary Questions

- The figure shows the total number of parliamentary questions each year from Tawan Legislative Yuan.



# Tentative Findings

- The figure shows the number of parliamentary questions identified as pork barrel feature by the CNN model across year.



# Takeaway

- In this paper, I aim to incorporate this application to **classify the parliamentary questions** and evaluate the hypothesis by looking at how electoral reform reduces legislator's incentive to deliver pork barrel projects.
- As you can see in the previous figures, a gradual decrease in the total number of pork-featured questions are accompanied by the electoral reform in 2008.
- In next step, I plan to conduct an in-depth text analysis to **compare the variation of topic categories across time** and evaluate pork barrel programs in the context of Taiwan politics.

Thank You



# Appendix

## Model Performance

[Model Performance I](#) | [Model Performance II](#) | [Model Performance III](#) | [Tensorboard](#)

## Data

[Sampled Non-Pork Featured Questions](#) | [Sampled Pork Featured Questions](#) | [Why CNN Not RNN](#)

## Miscellaneous

- PorkCNN: A Small Project for Pork Barrel Legislation Classification Using Convolutional Neural Networks (<https://github.com/davidycliao/PorkCNN>)
- legisCrawler: An Automation Webcrawling Toolkit for Retrieving Taiwan Parliamentary Questions (<https://github.com/davidycliao/legisCrawler>)

# Model Performance I

	precision	recall	f1-score	support
0	0.95	0.97	0.96	1566
1	0.94	0.91	0.92	825
accuracy			0.95	2391
macro avg	0.95	0.94	0.94	2391
weighted avg	0.95	0.95	0.95	2391

# Model Performance II

	Prediction: Not Pork (0)	Prediction: Pork (1)
Actual: Not Pork (0)	1520	46
Actual: Pork (1)	76	749

# Model Performance III

## Train Set

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22/22 [=====] - 48s 2s/step - loss: 0.0428 - accuracy: 0.9864  
- val\_loss: 0.1744 - val\_accuracy: 0.9423

- We quickly reach an accuracy of 0.9864 (98.6%) on the training data at 8th epoch

## Test Set

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11/11 [=====] - 5s 453ms/step - loss: 0.1744 - accuracy: 0.9423  
[0.17435400187969208, 0.942283570766449]

- The test-set accuracy turns out to be 94.2%.
- It is a bit lower than the training set accuracy (0.9864%). Slightly overfitting on training set.

# 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	Old-age benefits; labor retirement	Retired employees 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

# Non-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
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

# Why CNN Not RNN

- The CNN identifies patterns across space while the RNN is trained to learn the pattern across time or word/sentence sequence.
- The data set for training the model was classified by multiple combination of salient text features such as 軍公教 (military, teachers, public servant, farmer) or 補助款 (grant and subsidy).
- Fixed format and standard written style in official documents.
- We don't want the model to learn too much information from the text.

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the purpose of statute  
案由：本院委員林重謨、蔡啟芳、侯水盛、潘孟安、盧天麟、高建智、余政道、唐碧娥等 40 人，有鑒於最低基本工資可視為人民維持基本生活水準之意涵，現行每月僅有五千元之老年農民福利津貼相較於一萬五千八百四十元之法定基本工資，實已偏低，不但無法維持老年農民基本生活需求，亦與老年農民長期對國家的貢獻不成正比，更有違政府落實照顧農民的承諾，再加上近年來物價年年高漲，使老年農民生活的艱苦更加雪上加霜。職是之故，基於保障老年農民基本生活水準，肯定老年農民之貢獻並提升其生活品質，特擬具「老年農民福利津貼暫行條例第四條修正案」，比照國內法定基本工資之標準，將現行老年農民福利津貼發放金額由每月五千元提高至每月一萬五千元。increase farmer's allowance from NTD 5000  
improving living standards  
in light of the contribution made by the farmers  
to NTD 15000  
。是否有當，敬請公決。