Reading China: Predicting Policy Change with Machine Learning

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Policy Change Index (PCI) for China

The first *leading* indicator of China’s policy changes.

- Updated quarterly.
How to predict policy changes?

Build a machine learning algorithm to

- “read” the *People's Daily*;
- detect changes in how it prioritizes policy issues.

Official newspaper, 1946-present

(Artificial) neural networks
Source of predictive power

The Leninist tradition:

- “[T]he whole task of the Communists is to be able to convince the backward elements.”

- It is a fundamental necessity “to transform the press from an organ which primarily reports the political news of the day into a serious organ for the economic education of the mass of the population.”
Source of predictive power

People's Daily: nerve center of China's propaganda system

+ Propaganda often precedes policies.

Detect changes in newspaper’s priorities ≈ Predict changes in gov’t policies
Source of predictive power

People's Daily: nerve center of China’s propaganda system

Propaganda often precedes policies.

Detect changes in newspaper’s priorities ≈ Predict changes in gov’t policies

Front page?
Imagine an avid reader of the *People’s Daily* who

1. reads recent articles;
2. forms a paradigm about front-page content;
3. tests the paradigm on new articles.
Methodology

Articles in previous 5 years

Articles in next quarter

Modeling

Testing

“Forecasting”

PCI = Testing performance - “Forecasting” performance
Methodology

“Language-free” — it does not require the reading of the Chinese text.
<table>
<thead>
<tr>
<th>date</th>
<th>year</th>
<th>month</th>
<th>day</th>
<th>page</th>
<th>title</th>
<th>body</th>
<th>id</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018-10-01</td>
<td>2018</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>习近平在会见四川航空“中国民航英雄机组”全体成员时强调 学会英雄事迹 弘扬英雄精神 将非凡英雄精神融入日常工作</td>
<td>中共中央总书记、国家主席、中央军委主席习近平专门到四川航空“中国民航英雄机组”全体成员进行...</td>
<td>2018100000</td>
</tr>
<tr>
<td>2018-10-01</td>
<td>2018</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>烈士纪念日向人民英雄敬献花篮仪式在京隆重举行 习近平强调要弘扬英雄精神 践行英雄职责</td>
<td>9月30日上午，党和国家领导人习近平、李克强、栗战书、汪洋、王沪宁、赵乐际、韩正、王岐山...</td>
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<tr>
<td>2018-10-01</td>
<td>2018</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>庆祝中华人民共和国成立69周年 国务院举行国庆招待会 习近平等党和国家领导人出席</td>
<td>9月30日晚，国务院在北京人民大会堂举行国庆招待会，热烈庆祝中华人民共和国成立69周年...</td>
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<td>2018-10-01</td>
<td>2018</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>习近平就印度尼西亚苏拉威西省地震海啸向印尼总统佐科慰问</td>
<td>新华社北京9月30日电，9月30日，国家主席习近平就印度尼西亚苏拉威西省发生强烈地震及...</td>
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<td>2018-10-01</td>
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<td>1</td>
<td>2</td>
<td>在庆祝中华人民共和国成立69周年招待会上的致辞</td>
<td>各位来宾、各位朋友、同志们：今天，我们隆重庆祝中华人民共和国成立69周年。</td>
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</tr>
<tr>
<td>2018-10-01</td>
<td>2018</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>用奋斗成就复兴伟业(社论) ——热烈庆祝中华人民共和国成立69周年</td>
<td>时间的年轮，刻印下奋斗者的足迹。当10月的阳光照耀大地，我们迎来了共和国69岁华诞。...</td>
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<tr>
<td>2018-10-01</td>
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<td>2</td>
<td>国务院印发《决定》 进一步压减工业产品生产许可证管理目录和简化审批程序</td>
<td>新华社北京9月30日电，经李克强总理签批，国务院日前印发《关于进一步压减工业产品生产许可...</td>
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<tr>
<td>2018-10-01</td>
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<td>10</td>
<td>1</td>
<td>2</td>
<td>撰写新时代乡村振兴新篇章 ——论习近平总书记在第五个国家扶贫日上的重要讲话</td>
<td>本报评论员：乡村振兴既是一场攻坚战，更是一场持久战，必须咬定目标、一鼓作气，干...</td>
<td>2018100007</td>
</tr>
</tbody>
</table>
Methodology: data
Methodology: modelling

\[ \mathbf{x} \text{: each article as an observation.} \]

\[ \mathbf{y} = f(\mathbf{x}) \text{ : a complicated function.} \]
Methodology: modelling

Input

Texts

Metadata

Word embedding

Recurrent neural networks

Multilayer perceptron

Multilayer perceptron

 Neural networks

Output

Front page?

\( x \): each article as an observation.

\( f \): a complicated function.

\( y = f(x) \)
Results
Result: PCI — with ground truth
Result: PCI — with ground truth

- 1953 First Five-Year Plan
- 1958 Great Leap Forward
- 1966 Cultural Revolution
- 1976 Hua takes over
- 1978 Reform program starts
- 1989 Tiananmen Sq. protests
- 1993 Reform speed-up
- 2005 Reform slow-down
- 2008 Stimulus package
- 2013 Revive Maoism
- 2013 Renew reform program
- 2015 Supply-side structural reform
- Question mark
Understanding substance of change

<table>
<thead>
<tr>
<th>Front page?</th>
<th>Classified on front page?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td>√</td>
<td>false positives</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>false negatives</td>
<td>√</td>
</tr>
</tbody>
</table>

• Content of *mis*-classified articles has policy substance.
Understanding substance of change

Example: US-China trade conflict

What does the 2018 Q1 uptick represent?
Understanding substance of change
Example: US-China trade conflict

What does the 2018 Q1 uptick represent?

• Strengthening party authority;
• Playing up nationalism and global leadership;
• Populist policies to maintain support.
Understanding substance of change:
Example: US-China trade conflict

What does the 2018 Q1 uptick represent?

• Strengthening party authority;
• Playing up nationalism and global leadership;
• Populist policies to maintain support.

⇒ Curb your enthusiasm for trade talks.
Other applications
App 1: PCIs for other countries

Predicting other (ex-)Communist regimes’ policies:

- Soviet Union’s *Pravda*
- East Germany’s *Neues Deutschland*
- Cuba’s *Granma*
- North Korea’s *Rodong Sinmun*
- Vietnam’s *Nhân Dân*
App 1: PCls for other countries

Predicting other (ex-)Communist regimes’ policies:

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- Cuba’s Granma
- North Korea’s Rodong Sinmun
- Vietnam’s Nhân Dân
App 2: predicting vote change

Predicting vote change in legislation:

• Newspaper texts $\rightarrow$ Legislators’ public statements
• Page numbers $\rightarrow$ Legislators’ names
• What if Sen. A’s statement is mistaken as Sen. B’s?

Source of predictive power:

• Political necessity to justify vote changes by making different statements \textit{in advance}. 
App 3: investment (?)
App 3: investment (?)

A common investment model

This paper

Politics

Policies

Investment
App 3: investment (?)

This paper

Politics \rightarrow Policies \rightarrow Investment

A common investment model
Other apps

Omitted here. See our research paper.
Interested in DIY?

- Website: policychangeindex.com (newsletter sign-up)
- Source code: github.com/PSLmodels/PCI

- A simulated example to show how the PCI works.
Questions?