Reading China:

Predicting Policy Change with Machine Learning

Julian TszKin Chan  
(Bates White)

Weifeng Zhong  
(AEI)

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Policy Change Index (PCI) for China

China’s industrialization has been a product of gov’t direction.

PCI: the first *leading* indicator of China’s policy priorities.

- Covers 1951 Q1 – 2018 Q3.
- Can be updated in the future.
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, 1946-2018

(Artificial) neural networks
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
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Detect changes in newspaper’s priorities ≈ Predict changes in gov’t policies

Front page?
Methodology

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

Modeling

Testing

Articles in next quarter

“Forecasting”

PCI = Testing performance - “Forecasting” performance
Methodology

“Context-free” — it does not require an understanding of the Chinese context.
Methodology: modelling

Input

- Texts
- Metadata

Neural networks

- Word embedding
- Recurrent neural networks
- Multilayer perceptron

Output

- Front page?

\( \mathbf{x} \): each article as an observation.

\( f \): a complicated function.

\( y = f(\mathbf{x}) \)
Results
Result: PCI
Result: PCI — with ground truth
### Understanding substance of change

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

- Content of *mis*-classified articles has policy substance.
Potential applications
App 1: PCI for other countries

Predicting other (ex-)Communist regimes’ policies:

- USSR’s *Pravda*
- GDR (East Germany)’s *Neues Deutschland*
- DPRK (North Korea)’s *Rodong Sinmun*
- Cuba’s *Granma*
- Vietnam’s *Nhân Dân*
App 1: PCI for other countries

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PCI Cuba is in the works!
Measuring media bias in the US:

- Replicate the same analysis on US newspapers.
- Compare $PCI_{WaPo}$, $PCI_{NYT}$, $PCI_{WSJ}$, ...
- Divergence among $PCI$'s $\rightarrow$ Polarization in media
App 3: predicting vote change

Predicting vote change in legislation:

• *People’s Daily* articles $\rightarrow$ *Legislators’ public statements*

• Page numbers of articles $\rightarrow$ *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 *in advance.*
App 4: predicting ideology change

Predicting changes in judges’ ideological leaning:

- *People’s Daily* articles $\rightarrow$ Judges’ judicial opinions
- Page numbers of articles $\rightarrow$ Judges’ names
- What if Judge C’s opinion is mistaken as Judge D’s?

Source of predictive power:

- Changes in ideological leaning tend to be gradual yet long-lasting.
Next steps

- PCI China will be upgraded to a monthly index.
- PCI Cuba is in the works.
- Other applications...
Takeaways

• The first index to predict China’s “next big things.”

• A new way to uncover hidden patterns from trivial labels.

• A wide range of potential applications.
Interested in DIY?

- Website: www.policychangeindex.com (newsletter sign-up)
- Research paper: www.policychangeindex.com/Reading_China.pdf
- Source code: www.github.com/open-source-economics/PCI

Contact us:

- Julian TszKin Chan: ctszkin@gmail.com
- Weifeng Zhong: weifeng@weifengzhong.com
Questions?