Retrieving Implicit Information for Stock Movement Prediction

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Main Concept – Implicit Information

• Previous Work: Predict the Stock Movement of Sony (Mentioned in the News Article)

• This Paper: Predict the Stock Movement of Supply Chain Vendors (Not Mentioned in the News Article)
Benefit – The Sparse Temporal News Sequence

(a)

Ex.  Ex.  Ex.  Ex.  Index

(b)

Im.  Ex.  Im.  Ex.  Ex.  Index

predict

predict

<table>
<thead>
<tr>
<th>t-5</th>
<th>t-4</th>
<th>t-3</th>
<th>t-2</th>
<th>t-1</th>
<th>t</th>
<th>t+1</th>
</tr>
</thead>
</table>

Ex.  Ex.  Im.  Ex.  Im.  Ex.
News Distilling Network

Collaborative Filtering
Experiment

- Dataset

<table>
<thead>
<tr>
<th></th>
<th>Train</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>2013/06/22-2018/01/01</td>
<td>2018/01/01-2018/06/20</td>
</tr>
<tr>
<td>RISE</td>
<td>29,067</td>
<td>2,906</td>
</tr>
<tr>
<td>FALL</td>
<td>26,778</td>
<td>2,678</td>
</tr>
<tr>
<td>Total</td>
<td>55,845</td>
<td>5,584</td>
</tr>
</tbody>
</table>

- Cumulative Abnormal Return (CAR)

\[
CAR_{S,n} = \sum_{d=1}^{n} (R_{S,d} - \hat{R}_d)
\]
Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Acc. (%)</th>
<th>MCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random Guess</td>
<td>50.77</td>
<td>0.0147</td>
</tr>
<tr>
<td>BoW + Random Forest</td>
<td>50.97</td>
<td>0.0159</td>
</tr>
<tr>
<td>FastText + Random Forest</td>
<td>52.83</td>
<td>0.0485</td>
</tr>
<tr>
<td>HAN</td>
<td>54.37</td>
<td>0.0788</td>
</tr>
<tr>
<td>HAN&lt;sub&gt;s1&lt;/sub&gt;</td>
<td>53.85</td>
<td>0.0736</td>
</tr>
<tr>
<td>NDN&lt;sub&gt;s1&lt;/sub&gt; (Proposed)</td>
<td>56.75*</td>
<td>0.1302*</td>
</tr>
<tr>
<td>HAN&lt;sub&gt;s2&lt;/sub&gt;</td>
<td>56.77*</td>
<td>0.1300*</td>
</tr>
<tr>
<td>NDN&lt;sub&gt;s2&lt;/sub&gt; (Proposed)</td>
<td>57.89*</td>
<td>0.1536*</td>
</tr>
</tbody>
</table>

- Setting 1 (S1): We **fused all news regardless of the existence of manual stock labels** to evaluate the robustness of the selection and attention mechanism.
- Setting 2 (S2): **We integrate manually labeled implicitly related news with explicit news** to determine whether information from related news aids the prediction task. For NDN, all kinds of news were fed into the model. The results under this setting can be considered as the upper-bound of the models with implicit information.
Conclusion

• We discuss the problem of sparse temporal news sequences as well as the shortcoming of previous works that are based on explicit news only.

• We develop news distilling networks for discovering implicitly related news given limited labels.

• The experiments on the real-world data show that the proposed methods significantly improve the accuracy of stock movement prediction and yield greater profits than the previous methods.
Related Works and Events

• Related Works
  • Dynamic Graph Transformer for Implicit Tag Recognition. EACL’21
  • FinSense: An Assistant System for Financial Journalists and Investors. WSDM’21
  • Springer SpringerBriefs: From Opinion Mining to Financial Argument Mining

• Related Events
  • FinNum-3 Shared Task @ NTCIR-2022 – Investor's and Manager’s Fine-grained Claim Detection
  • The Third Workshop of Financial Technology and Natural Language Processing (FinNLP-2021 @ IJCAI-2021)
  • The 2nd Workshop on Financial Technology on the Web (FinWeb-2022) (May be in conjunction with WWW’22)
  • EMNLP-2021 Tutorial: Financial Opinion Mining

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Feel free to contact us if you have any questions.

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