Style Change Detection on Real-World Data using an LSTM-powered Attribution Algorithm

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Overview

1. Approach

2. Results

3. Future Work
Task 1 - Approach

- MLP with 3 hidden FC layers with ReLU activation
- Utilize per-document embeddings
- We suppose MLPs can differentiate on a per-document basis
Task 2 - Approach

- Based on per-paragraph word embeddings and textual features
- Two-layered Bidirectional LSTM model with 128 hidden units per layer
- Masking layer, and a Time-Distributed layer as the output layer with a sigmoid activation function
- Binary cross-entropy as the loss function
- We anticipate LSTMs can learn similarities/changes in style on a per-paragraph basis
Task 3 - Approach

- Iterative per-paragraph authorship attribution decision
- Utilize Task-2 LSTM for comparing current paragraph with all previous paragraphs
- Decision *change*: Continue to next iteration
- Decision *no change*: Author is the same as author of reference
- New author when iterations done
Results & Discussion

<table>
<thead>
<tr>
<th></th>
<th>(F_1)</th>
<th>Accuracy</th>
<th>Precision</th>
<th>Recall</th>
<th>Test set (F_1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1</td>
<td>86.86</td>
<td>79.16</td>
<td>91.88</td>
<td>82.37</td>
<td>62.08</td>
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<tr>
<td>Task 2</td>
<td>79.18</td>
<td>95.95</td>
<td>87.26</td>
<td>72.47</td>
<td>66.90</td>
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<tr>
<td>Task 3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>26.25</td>
</tr>
</tbody>
</table>

Table: Results on the validation data and test data

- Task 1 and Task 2 could be solved with relatively simple models
- Low score on test set suggests bad generalization
- Bottleneck of Task 3 is iterative prediction
- Low score suggests: Using one-on-one comparison is not enough
Future Work

- Create author profiles
- Parallelizing the loop of the attribution algorithm to increase computation speed
- Clustering/classification model
Robert Deibel and Denise Löfflad.  
Style change detection on real-world data using lstm-powered attribution algorithm.  
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Thank you for your attention!