Lancaster A at SemEval-2017 Task 5: Evaluation metrics matter: predicting sentiment from financial news headlines

Andrew Moore and Paul Rayson
School of Computing and Communications, Lancaster University, UK
@apmoore94 @perayson

**Pre-Processing**
- Lower cased.
- Tokenized using Unitok.

**Problem**
Predict the sentiment of financial headlines with respect to a company mentioned within the headlines.

**Data**
- Financial Word Embeddings
- 1142 Training examples.
- 491 test examples

**Methods**

**Early Stopping Bi-Direction LSTM (ELSTM)**
- Word Vectors (L, 300)
- Drop out (L, 42)
- Bi-Directional LSTM (L, 42)
- Drop out (L, 42)
- Bi-Directional LSTM (1, 42)
- Drop out (1, 42)
- Output (1, 42)

**Standard Bi-Direction LSTM (SLSTM)**
- Word Vectors (L, 300)
- Bi-Directional LSTM (L, 42)
- Bi-Directional LSTM (1, 42)
- Output (1, 42)

**SVR. With the following features:**
- Uni- and Bi- grams word representations.
- Special word representations where company names, positive and negative words were replaced with special tokens respectively.
- The aspect (company name) of the sentence of which the sentiment is with respect to.

**Evaluation**

**Metric 1**
Cosine Similarity (CS)
\[ \frac{\sum_{i=1}^{K} y_i \hat{y}_i}{\sqrt{\sum_{i=1}^{K} y_i^2} \sqrt{\sum_{i=1}^{K} \hat{y}_i^2}} \]

**Metric 2**
\[ \sum_{n=1}^{N} CS(\hat{y}_n, y_n) \]

**Metric 3**
\[ \sum_{n=1}^{N} \left\{ \begin{array}{ll} len(\hat{y}_n) \times CS(\hat{y}_n, y_n), & \text{if } len(\hat{y}_n) > 1 \\ 1 - |y - \hat{y}_n|, & \text{if } \hat{y}_n \geq 0 \end{array} \right. \]

**Results**

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVR</td>
<td>62.14</td>
<td>54.59</td>
<td>62.34</td>
</tr>
<tr>
<td>SLSTM</td>
<td>72.89</td>
<td>61.55</td>
<td>68.64</td>
</tr>
<tr>
<td>ELSTM</td>
<td>73.20</td>
<td>61.98</td>
<td>69.24</td>
</tr>
</tbody>
</table>

1. https://github.com/apmoore1/semeval/tree/master/models/word2vec_models
Code available here: https://github.com/apmoore1/semeval