Numeral Attachment with Auxiliary Tasks

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**Task Definition**

**Numeral Attachment:**
\[ $\text{SNE OK NE, last time oil was over } $65 \text{ you were close to } $8. \text{ Giddy-up…}$

**Reasoning:**
\[ $\text{SIBB had to ride this Train with Reversal candle. Down more than } 9\% \text{ from } 342.50$\]

**Text Representation**

<table>
<thead>
<tr>
<th>Token Embedding</th>
<th>Character Embedding</th>
<th>Position Embedding</th>
<th>Magnitude Embedding</th>
</tr>
</thead>
<tbody>
<tr>
<td>( E_{\text{tok}} )</td>
<td>( E_{\text{char}} )</td>
<td>( E_{\text{pos}} )</td>
<td>( M_{\text{mag}} )</td>
</tr>
</tbody>
</table>

**Experimental Results**

**Logistic Regression**
Logistic regression with the bag of words features

**Adversarial Training (AT)**
The model for relation extraction, which adds some perturbations during training the model constructed by bidirectional LSTM and CRF.

**Attentive-CNN**
We add an attention layer as the first layer of the capsule network model, and replace the capsule network in our model with a two-layer CNN.

<table>
<thead>
<tr>
<th>Model</th>
<th>Macro-F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistic Regression</td>
<td>51.11%</td>
</tr>
<tr>
<td>AT</td>
<td>53.36%</td>
</tr>
<tr>
<td>Attentive-CNN</td>
<td>72.64%</td>
</tr>
<tr>
<td>Capsule-based</td>
<td>73.46%</td>
</tr>
</tbody>
</table>

**Ablation Analysis**

| Model | Caps-m | Caps-mb | Caps-nt | Caps-all |
|-------|--------|--------|--------|
| Main Task | v | v | v | v |
| Reason-binary | v | v | v |
| Reason-type | v | v | v |
| Macro-F1 | 67.14\% | 69.97\% | 66.95\% | 73.46\% |

**Error Analysis**

**Related Works**

FinNum-2 Shared Task in NTCIR 2020
- The pilot dataset proposed in this paper is available now.
- More than 15,000 instances in 10,000 unique tweets will be available.
- Macro-F1 score is adopted for evaluating the experimental results.

Numeracy-600K in ACL 2019
- Learning Numeracy for Detecting Exaggerated Information in Market Comments