### Introduction
**Goal:** Detect sub-events in social media streams (i.e., Twitter)

**Motivation:**
(i) Difficult to track sub-events in Twitter streams
(ii) Different perspectives of the same event (e.g., emergency situations) compared to traditional media

**Task:** Sub-event detection in sport Twitter stream

### Idea
**Challenges:**
(i) Noisy nature of Twitter streams (e.g., event tweets interspersed with others, non-event related info interjected)
(ii) People reporting the same thing

**Contribution:**
(i) Frame the problem as a sequence labeling task
(ii) Exploit the use of a chronological LSTM

### Model
![Diagram of the model](https://ugentt2k.github.io)

- **Gold Labels**
  - **GOAL**
  - **RED CARD**

- **Units**
  - (a) Bins (Tweets in fixed time intervals)
  - (b) Units

- **Word Embeddings**
  - [W₁₁, W₁₂, W₁₃, W₁₄]

- **Representation**
  - CNN-AVG pool

- **Chronological LSTM**
  - Output

- **Why is Relaxed evaluation flawed?**

- **Rationale:** If a model assigns a different label to each of the bins of a sub-event, then this sub-event counts as a true positive

### Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Bin-level</th>
<th>Relaxed</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL</td>
<td>P</td>
<td>R</td>
</tr>
<tr>
<td>Word-tfidf</td>
<td>-</td>
<td>49.40</td>
</tr>
<tr>
<td>Word-AVG</td>
<td>-</td>
<td>51.40</td>
</tr>
<tr>
<td>Word-CNN-AVG</td>
<td>-</td>
<td>56.93</td>
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<tr>
<td>Word-attention</td>
<td>-</td>
<td>52.92</td>
</tr>
<tr>
<td>Tweet-AVG</td>
<td>✓</td>
<td>49.04</td>
</tr>
<tr>
<td>Tweet-attention</td>
<td>✓</td>
<td>51.99</td>
</tr>
<tr>
<td>Tweet-CNN</td>
<td>✓</td>
<td>58.88</td>
</tr>
</tbody>
</table>

**Why is Relaxed evaluation flawed?**

- **Gold Label**
  - B-GOAL
  - I-GOAL
  - I-GOAL
  - I-GOAL
- **Predictions**
  - B-RED CARD
  - I-RED CARD
  - I-RED CARD
  - I-RED CARD

**Rationale:** If a model assigns a different label to each of the bins of a sub-event, then this sub-event counts as a true positive

### Conclusions
(i) New neural model for binary sub-event detection
(ii) Propose a strong model to predict sub-event types
(iii) Extend the model with the idea of exchanging chronological information between sequential posts, and
(iv) Using a chronological LSTM is beneficial in almost all examined architectures.

### References