Why NewsEnv? A Motivating Example

- **Assumption:** A news environment is an important inspiration of the fabrication of contemporary fake news, as fake news has to grab attention from it.

Let’s observe the NewsEnv as a fake news creator!

News Environment (containing recent news items) in 2019/11/12~2019/11/14. Events are differentiated by colors.

Proposal: Perceive Popularity & Novelty from the NewsEnv

- **Popularity:** Fake news tends to emerge along with a popular event, to obtain great exposure and impacts.
- **Novelty:** Fake news often provides novel side information for a popular event, to catch audiences’ attention and boost the spread.

NewsEnv Perception (NEP) Framework

**Step 1: NewsEnv Construction**

- **MacroEnv:** A full dump of recent news items (say, 3d) from selected outlets to reflect the represent distribution of mainstream focuses.
- **MicroEnv:** Retrieve top-k similar news items to the target post p, to build an event-constrained environment.

**Step 2: NewsEnv Perception**

1. **Representation and Similarity Calculation:** Use BERT to obtain vectors and cosine similarity to obtain the post-news item similarity.
2. **Gaussian Kernel Pooling:** Transform the sim list into a fixed-dim vector.
   - Determine the kernel distribution across [-1,1]
   - Calculate Gaussian outputs for each kernel. Sum, concat, & norm to obtain the Kernel Output.
   - For Popularity-Oriented MacroEnv \(E^{(\text{pop})}\) Perception: Obtain the Kernel Output for \(p \cdot E^{(\text{pop})}\).

Experiments on New Datasets

**Datasets:** News Outlets in NewsEnv

**Performances:** 
- All six base models see an improvement in terms of Acc. and macF1.

Conclusion

**Problem:** To the best of our knowledge, we are the first to incorporate news environment perception in fake news detection.

**Method:** We propose the NEP framework which exploits the perceived signals from the macro and micro news environments of the given post for fake news detection.

**Data & Experiments:** We construct the first dataset that includes contemporary main-stream news data for fake news detection. Experiments on offline and online data show the effectiveness of NEP.