Natural Language Processing and Text Analytics for Earthquake Reconnaissance
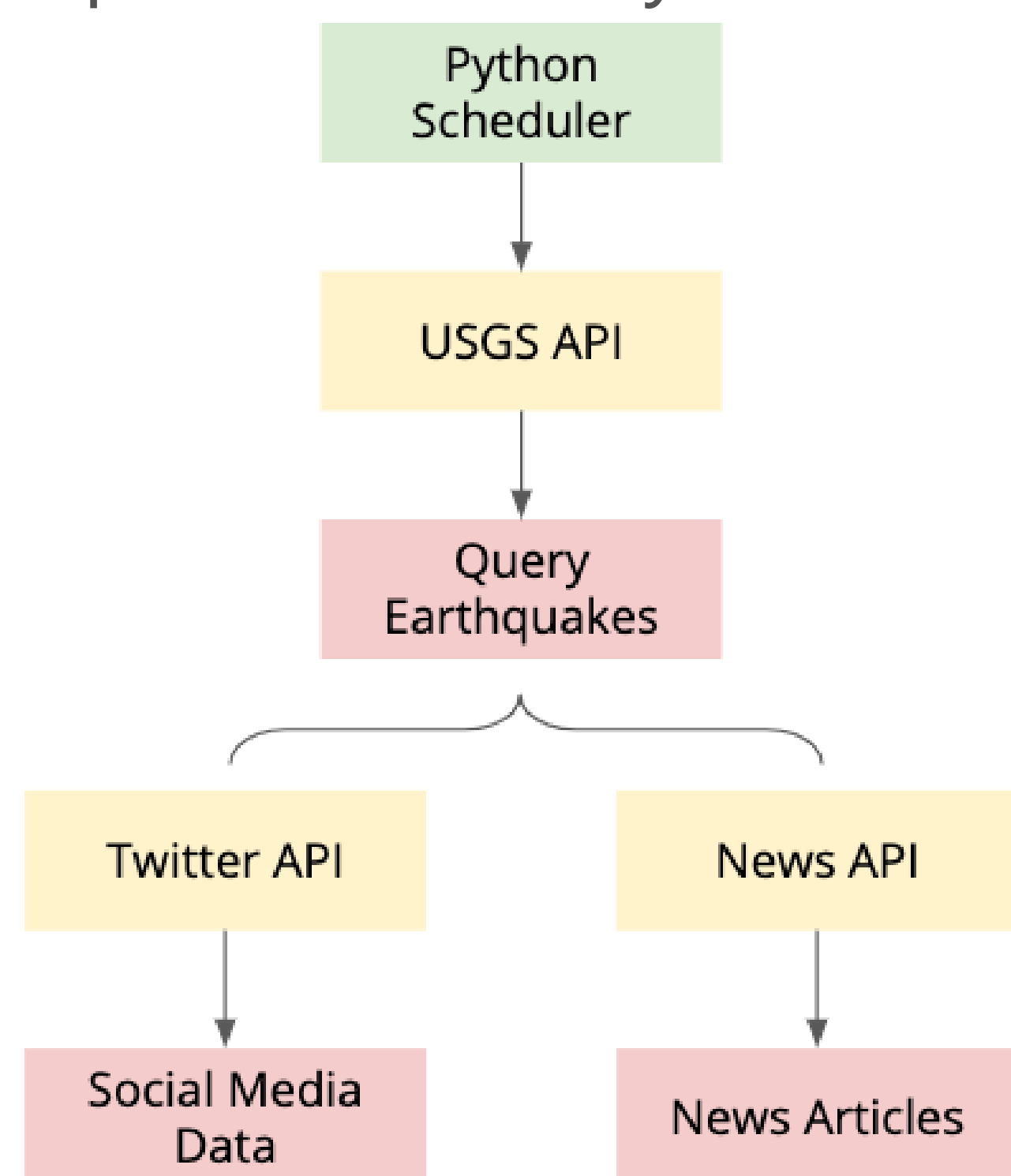
PEER Transportation Systems Research Program

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Automatic Data Collection

- Collect daily social media and news data for any earthquake that has magnitude ≥ 5 and USGS PAGER alert level in yellow, orange or red.

- Data and scripts are currently hosted at PEER server.
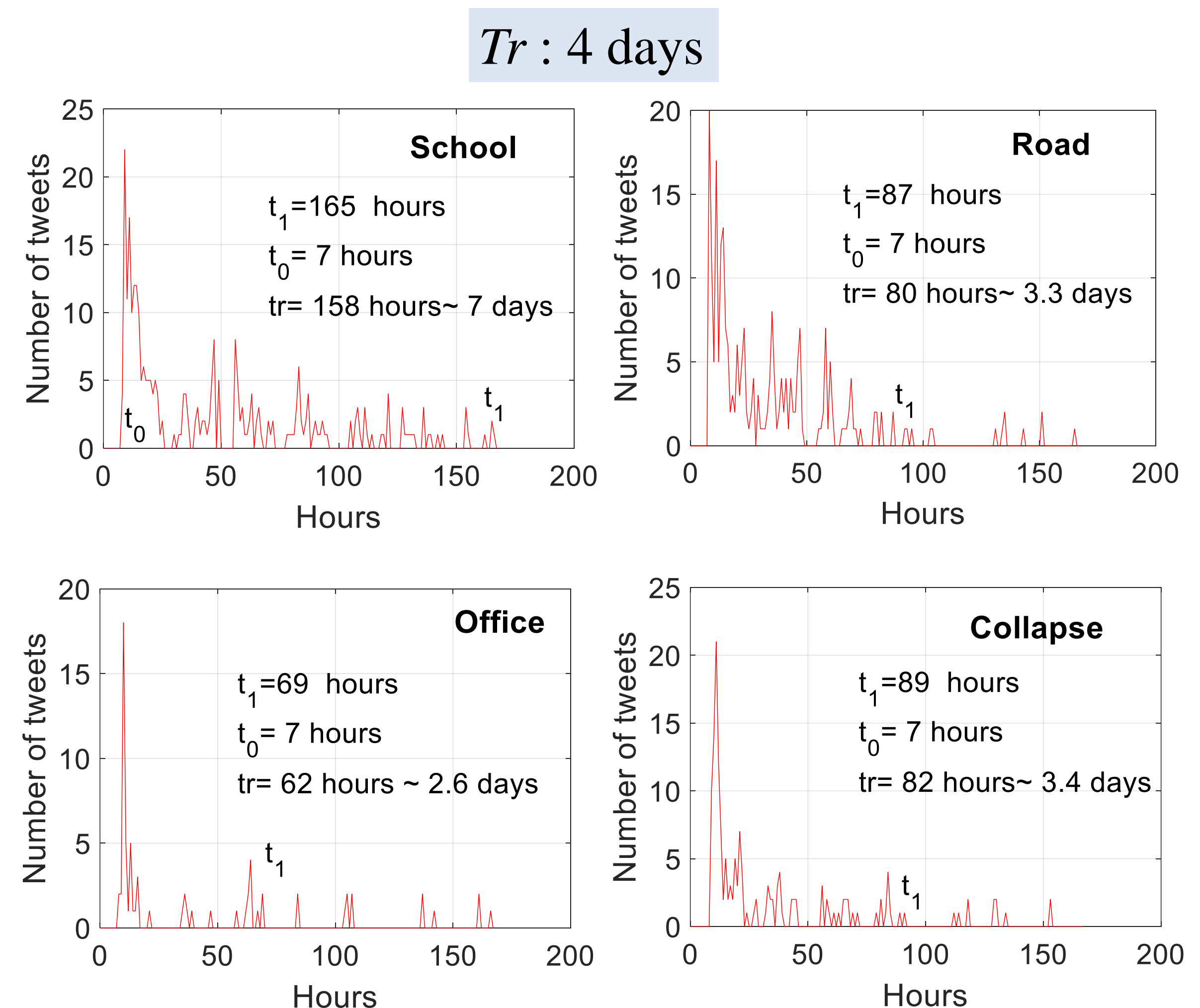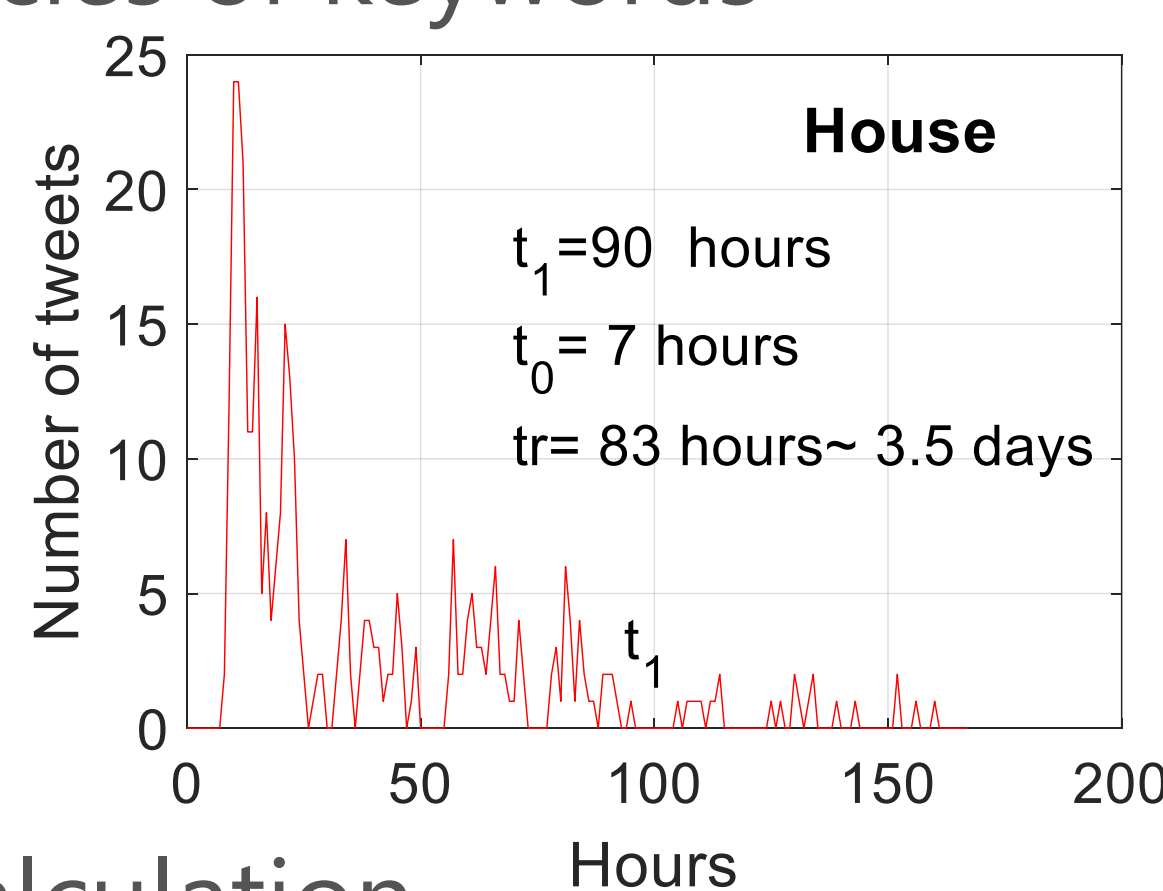

Automatic Summarization

- Generate summary from news articles for earthquake briefing and report.

- Provide a fast reference for researchers interested in field work by reducing report preparation time.

- Earthquake briefings and reports that used automatic summarization recently: ***Albania Mw 6.4, Philippines Mw 6.8*** and ***Puerto Rico Mw 5.8 & 6.4***.

Text Analytics in Social Media

- <u>Resilience analysis</u>: Analyze frequencies of keywords in social media to fit a proposed mathematical model.

- <u>Future work</u>: integrate summarization & text analytics with automatic data collection & MMI calculation

Recovery Time Computations for 2013 Lushan, China Earthquake: A Case Study [Data Source: Weibo 🐦]

- Determine factors related to recovery and assign weights to them (schools: 20%, roads: 20%, houses: 20%, offices: 20%, collapse: 20%).

- Determine the variation of the number of tweets related to these factors with time.

- Determine the recovery time (tr) for each factor from the frequency (f) plots, where $tr = t_1 - t_0$, t_0 is the earthquake occurrence time, and t_1 is the time when the number of tweets fall below a certain threshold (e.g. 15% of f_{max}) and become steady.

- Determine the resulting recovery time as weighted average of the recovery time from each factor.

$$Tr = \sum_{i=1}^{N} tr_i\, w_i$$

Tr: recovery time
N: number of considered factors
tr_i: recovery time for factor *i*
w_i: weight for factor *i*

Tr : 4 days

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