

WIS @ the NTCIR-12 Temporalia-2 Tasks

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Agenda:

1. Intuitions about different methods
2. Time-series Data
3. Features leveraged in our runs
4. Predictor Choice
5. Error Analysis

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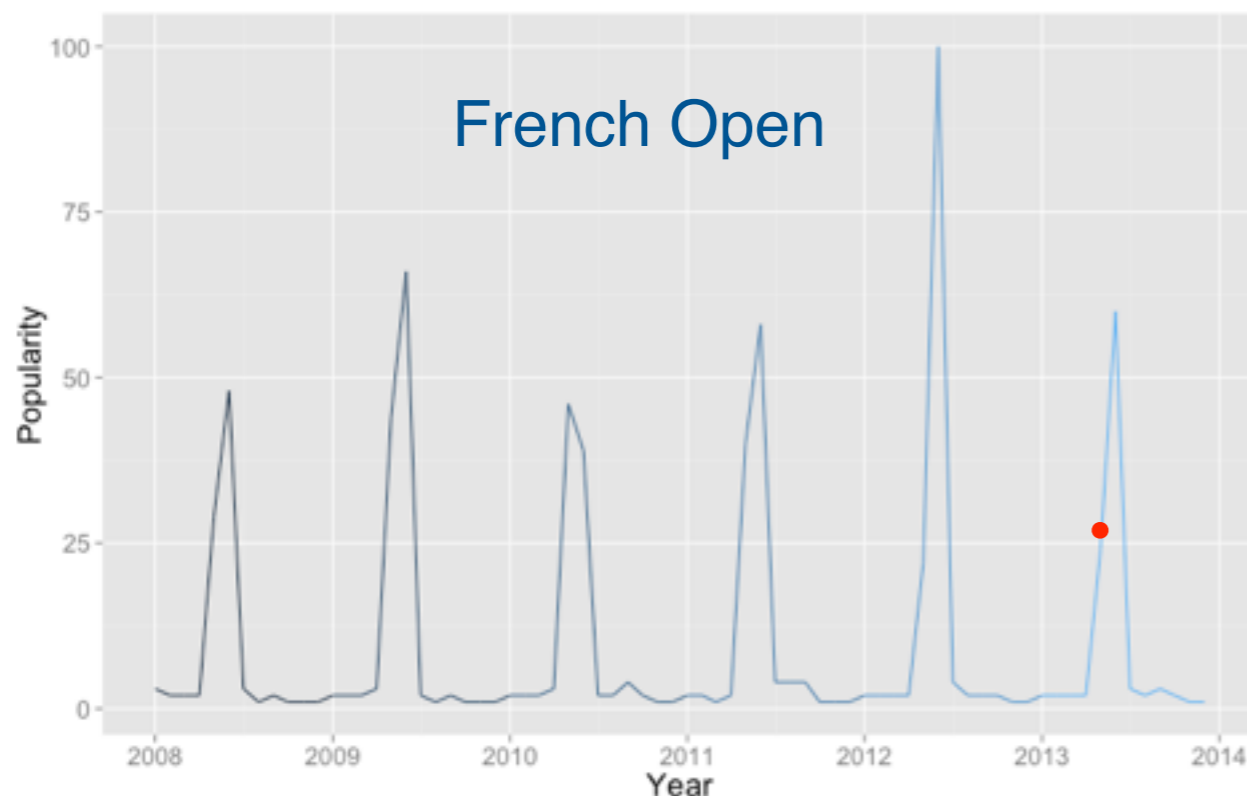
Intuitions:

1. External data might be needed
 - In TQIC subtask, **127/300** queries in formal run have TEs. In TID subtask, only **15/93** queries in dry run have TEs.
 - Previous studies show that only about **1.5%** queries have explicit temporal expressions in their content.
2. Both regression and classification can be employed in TID subtask
 - Regression with Multiple Dependent Variables can be used for estimating the probability of 4-class temporal intent directly
 - By our understanding, probabilistic classification is more similar to the way data generated by nature.

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Time-series data:

On Google Trend, how users' interest about queries (e.g. French Open) changed with time can be accessed easily.

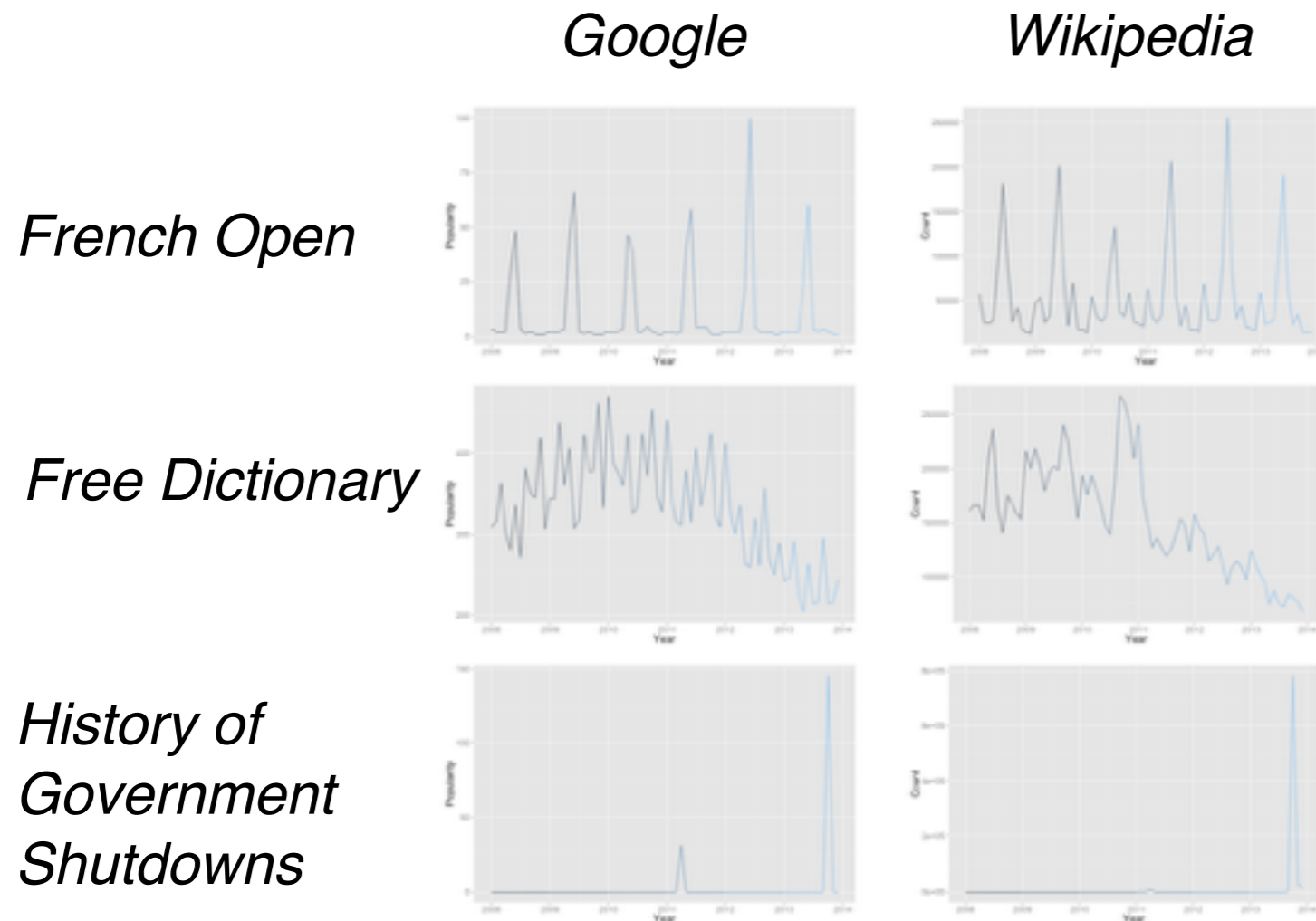


- No absolute frequencies are available
- It is unknown what data pre-processing & cleaning steps occurred
- The aggregations only occur at a month-by-month (week) level

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Time-series data:

1. Wikipedia pageviews



- Raw data can be accessed publicly

- Similar to Google Trends.

- Suitable for further work

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Feature Extraction:

1. Query content features

- Lemma
- Named Entities
- Temporal Expressions
- Verb Tense

2. Time-series features

- Sparsity
- Seasonality
- Autocorrelation
- Hottest time
- Stats

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Predictor Choice:

1. Regression with Multiple Dependent Variables:

- P: Models can be used and optimized to predict the results directly
- N: Prediction results are stepwise

2. Probability classifier: “French Open” with *Future* 0.6 and *Atemporal* 0.4 is extended as 100 “French Open” (60 tagged as *Future* and 40 *Atemporal*)

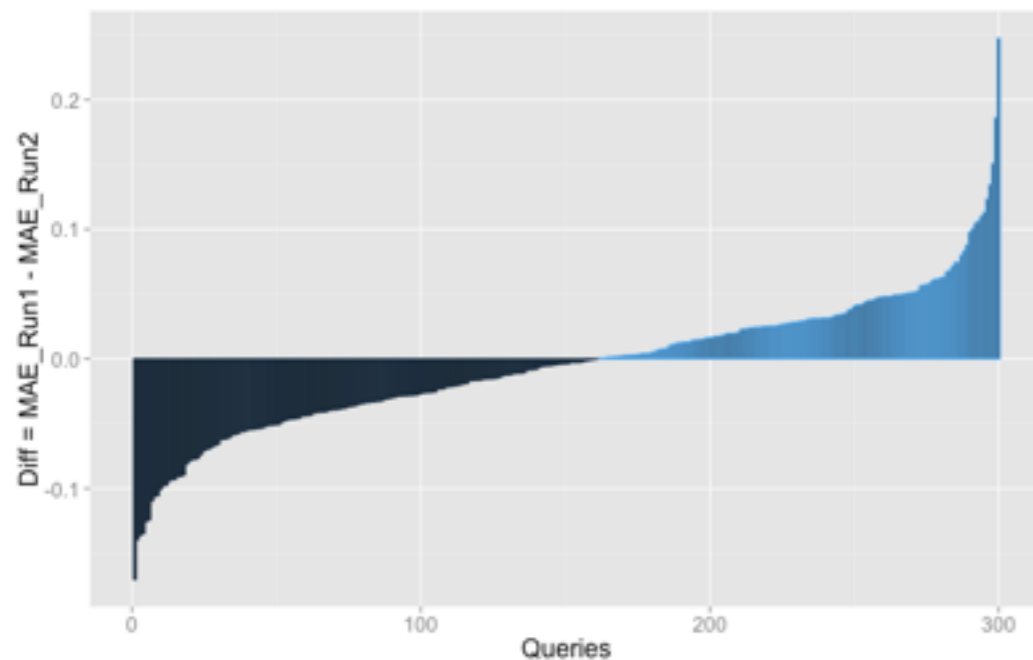
- P: Prediction process is more similar to the way how data generated
- P: Prediction results are stepwise
- N: Models is not generated by the original tags.

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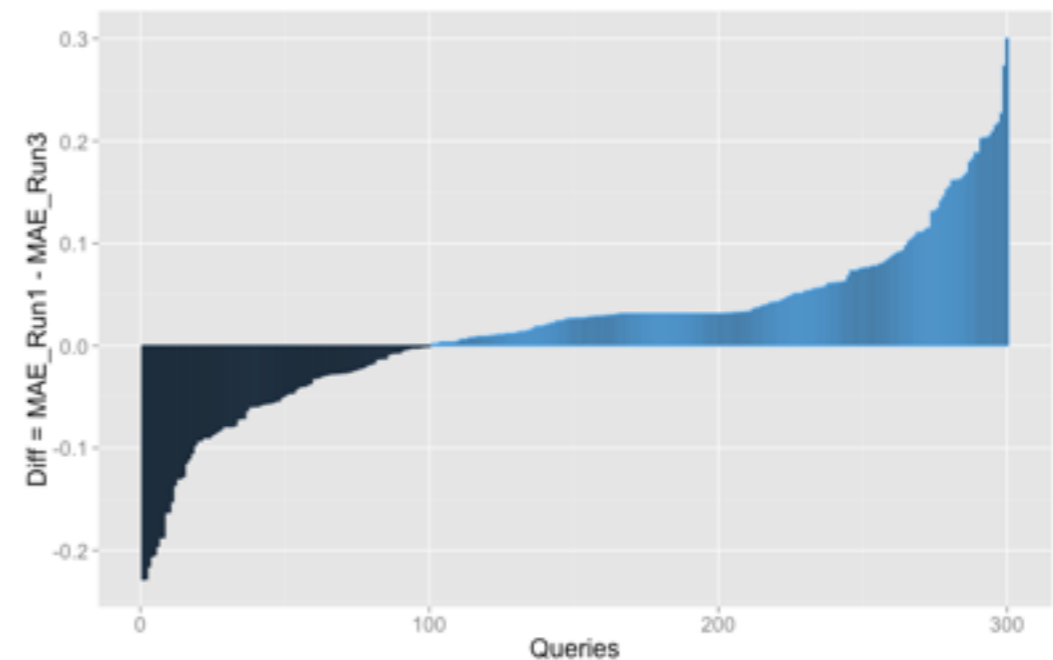
Error Analysis:

1. MAE comparison:

- **Run 1** (Baseline): query content features + linear regression
- **Run 2**: query content features + time-series features + linear regression
- **Run 3**: query content features + SVM classification



Run 1 vs Run 2



Run 1 vs Run 3

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Error Analysis:

2. Ablation study:

MAE	WIS-TID-E-1	WIS-TID-E-2	WIS-TID-E-3
<i>Baseline</i>	0.215	0.219	0.197
- <i>Lemma&NN</i>	+0.0128	+0.0034	+0.0275
- <i>TE</i>	+0.0075	+0.0053	+0.0119
- <i>Verb</i>	+0.0052	-0.0007	-0.0103
- <i>Wiki&Type</i>	-	-0.0036	-
- <i>Sparsity</i>	-	-0.0043	-
- <i>Season</i>	-	-0.0011	-
- <i>AutoCor</i>	-	+0.0003	-
- <i>Ref</i>	-	-0.0002	-
- <i>Stats</i>	-	+0.0003	-

Cos Sim	WIS-TID-E-1	WIS-TID-E-2	WIS-TID-E-3
<i>Baseline</i>	0.792	0.773	0.791
- <i>Lemma&NN</i>	-0.0437	-0.0085	-0.0614
- <i>TE</i>	-0.0208	-0.0186	-0.0314
- <i>Verb</i>	-0.0118	+0.0016	+0.0252
- <i>Wiki&Type</i>	-	+0.0148	-
- <i>Sparsity</i>	-	+0.0147	-
- <i>Season</i>	-	+0.0048	-
- <i>AutoCor</i>	-	-0.0003	-
- <i>Ref</i>	-	+0.0006	-
- <i>Stats</i>	-	-0.0010	-

- MAE and cosine similarity show similar trends
- Run 2 reduces the effect of lemmas and named entities
- Verbs show different influence on different models

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++++ WIS-TID-E-1 outperforms WIS-TID-E-3 +++++

#106 Barack Obama is the 44th US president
 #100 science fiction is a popular
 #117 is it easy to find a job in hong kong
 #175 How college is different from high school
 #009 When Does Time Change

++++ WIS-TID-E-3 outperforms WIS-TID-E-1 +++++

#069 estimate on the Debt Crisis in Greece
 #043 The original building was built in 1710
 #219 When Did WW2 Start
 #026 when does fall start
 #165 sovereign debt crisis

Questions?

Thanks