A Comparison of Approaches to Large-Scale Data Analysis

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Presentation Goals

The purpose of paper is to consider MapReduce and a regular Database Management Systems for large-scale data analysis.

1. **Parallel DBMS** and **MR**, two approaches to large-scale data analysis.
2. Thee **Architectural Elements** of DBMS and MR.
3. Outlinei of **Benchmark Results** and **Best Practice** for large-scale data analysis.

Database Management System

Title: **Tracking the flu pandemic by monitoring the Social Web**
Authors: V. Lampos and N. Cristianini
Submitted to: IAPR Cognitive Information Processing 2010 (accepted)

- Twitter and Health Protection Agency data for weeks 26-49, 2009 (on average 160,000 tweets collected per day geolocated in 54 urban centres in the UK)
- Frequency of **41 flu related words** (markers) in Twitter corpus had a correlation of $>$**80%** with the HPA flu rates in all UK regions
- Learn a better list of weighted markers **automatically**:
  - Generate a list of candidate markers (1560 words taken from flu related web pages)
  - Use **LASSO** for feature selection

DBMS -

Validation schemes:

1. Train on one region, validate regularisation parameter on another, test on the remaining regions (for all possible combinations)

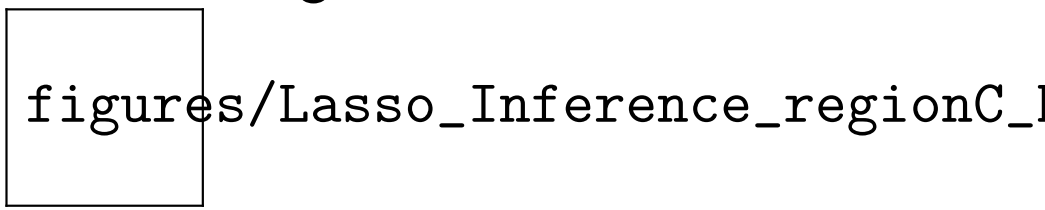
Train/Validate (regions)	A	B	C	D	E
A	-	0.9594	0.9375	0.9348	0.9297
B	0.9455	-	0.9476	0.9267	0.9003
C	0.9154	0.9513	-	0.8188	0.908
D	0.9463	0.9459	0.9424	-	0.9337
E	0.8798	0.9506	0.9455	0.8935	-
				Total Avg.	**0.9256**

97 selected words: lung, unwel, temperatur, like, headach, season, unusu, chronic, child, dai, appetit, stai, symptom, spread, diarrhoea, start, muscl, weaken, immun, feel, liver, plenti, antivir, follow, sore, peopl, nation, small, pandem, pregnant, thermomet, bed, loss, heart, mention, condit, ...

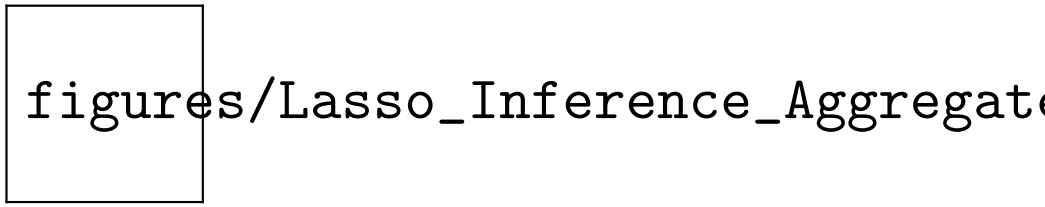
2. Aggregate data from all regions, test on weeks 28 and 41 (2009) and train using the rest of the data set

DBMS - hei

1. Inferred vs Official flu rate in North England



2. Inferred vs Official rates in all regions (aggregated data set)



MR -

Title: **Flu detector - Tracking epidemics on Twitter**
Authors: V. Lampos, T. De Bie, and N. Cristianini
Submitted to: ECML PKDD 2010 Demos (under review)

- Extending and making more robust the methodology of P1
- Larger data sets (bigger time series) and more (2675) candidate features
- Select a list of features (markers) using BoLASSO (bootstrap version of LASSO)
- Then learn weights of those markers via linear least squares regression
- Stricter evaluation of the methodology - **Available online**
- Put all this into practice and come up with the **Flu detector**

Schema Support

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

Indexing

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

Programming Model

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

Data Distribution

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

Execution Strategy

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

Flexibility

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

Fault Tolerance

1. ... (content omitted)
2. ... (content omitted)
3. ... (content omitted)
4. ... (content omitted)

A more time specific tentative plan

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Any questions?