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Learning from Social Media & Contextualisation

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User-Generated Content in Social Media
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Research Objectives

- **Learning from Social Media: main trends vs peculiarities**
  - Information Mining to extract main trends and behaviour
    - Main topics
    - Main users (e.g. influential users on a topic)
    - Following dissemination (e.g. flu, typhon)
    - Link between information (e.g. location information extraction)
  - Information Mining to detect peculiarities and weak signals
    - Used in Business Intelligence
      - Knowledge of the environment / contexts
      - Detect opportunities / risks
      - Detect changes

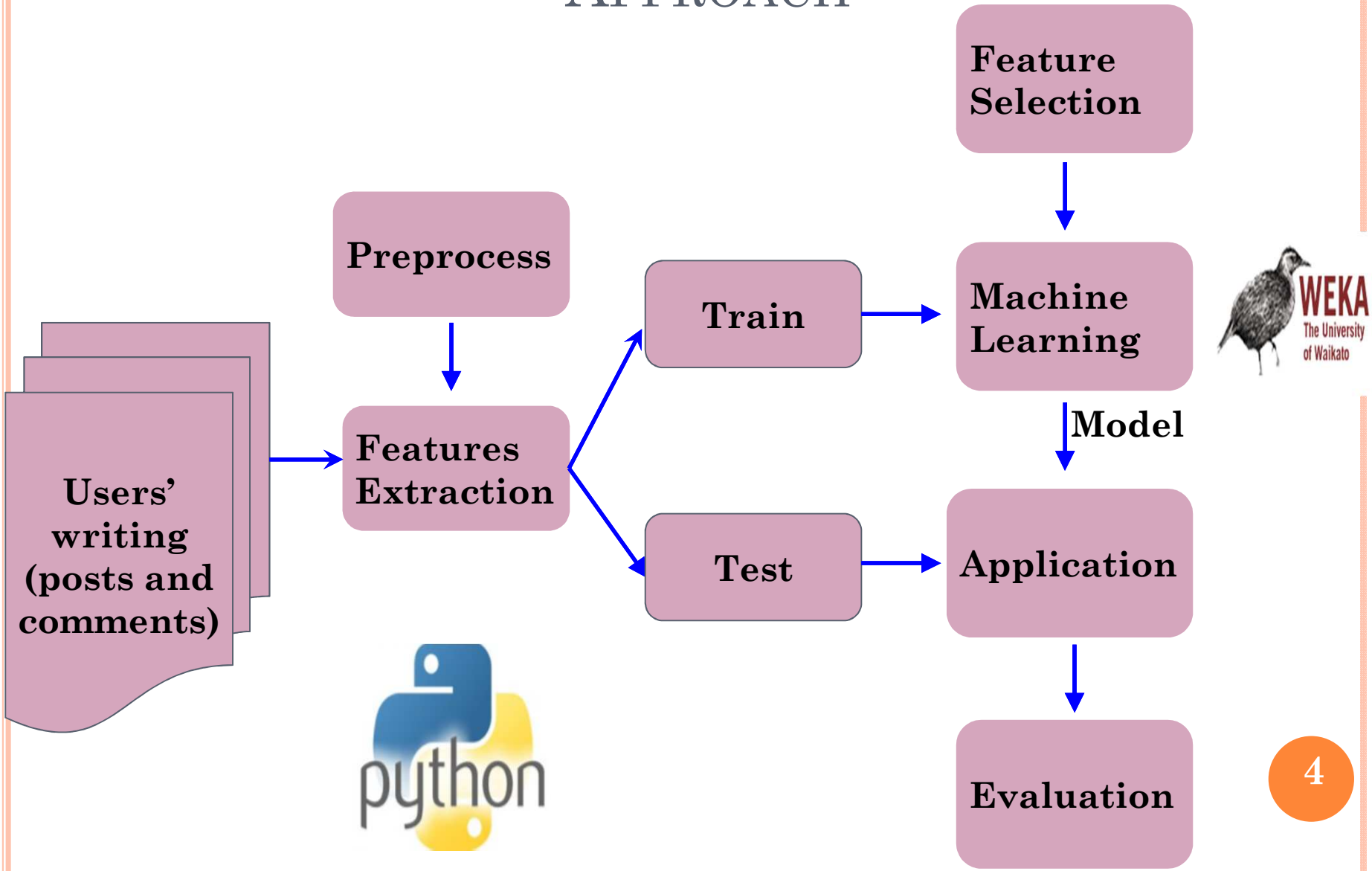
Detecting changes in behaviour : **early detection of depression**

Related Work in Depression Detection

Supervised learning based on 6 main groups of features:

- **N-grams:** unigram, bigram and trigram *[Yang et al., 2015]*;
- **Relevant Lexicons:** depression symptoms, lexicon of drug names etc.(wikipedia)**;**
- **Linguistic Style:** frequency of negative word, quantifiers, quantity of first personal pronoun, quantity of emoticons, numbers of exclamation and question marks etc. *[Coppersmith et al., 2014]*;
- **Users Behaviors:** number of words/posts, proportion of reply posts from a user per day etc., user's active period or posting time span *[Choudhury, 2016]***;**
- **Sentiment analysis:** sentence polarity, sentiment words - positive and negative sentiment *[Mowery et al., 2016]*;
- **Emotion analysis:** categories of emotions - emotional degree *[Choudhury, 2016]*.

Our Natural Language Processing Approach



5 Main Groups of Extracted Features

- **Bag of Words:** 18 most frequent unigrams (depressive) - our baseline
- **Group 1: Language Style** 13 features
  - Negation frequency
- **Group 2: Self-Preoccupation** 9 features
  - Frequency of Personal Pronouns
- **Group 3: Reminiscence and Relevant Words** 5+5 f
  - Past tense
  - Reference to related drugs
- **Group 4: Sentiment and Emotion** 3+8 features
  - Positive sentiment
  - Sadness

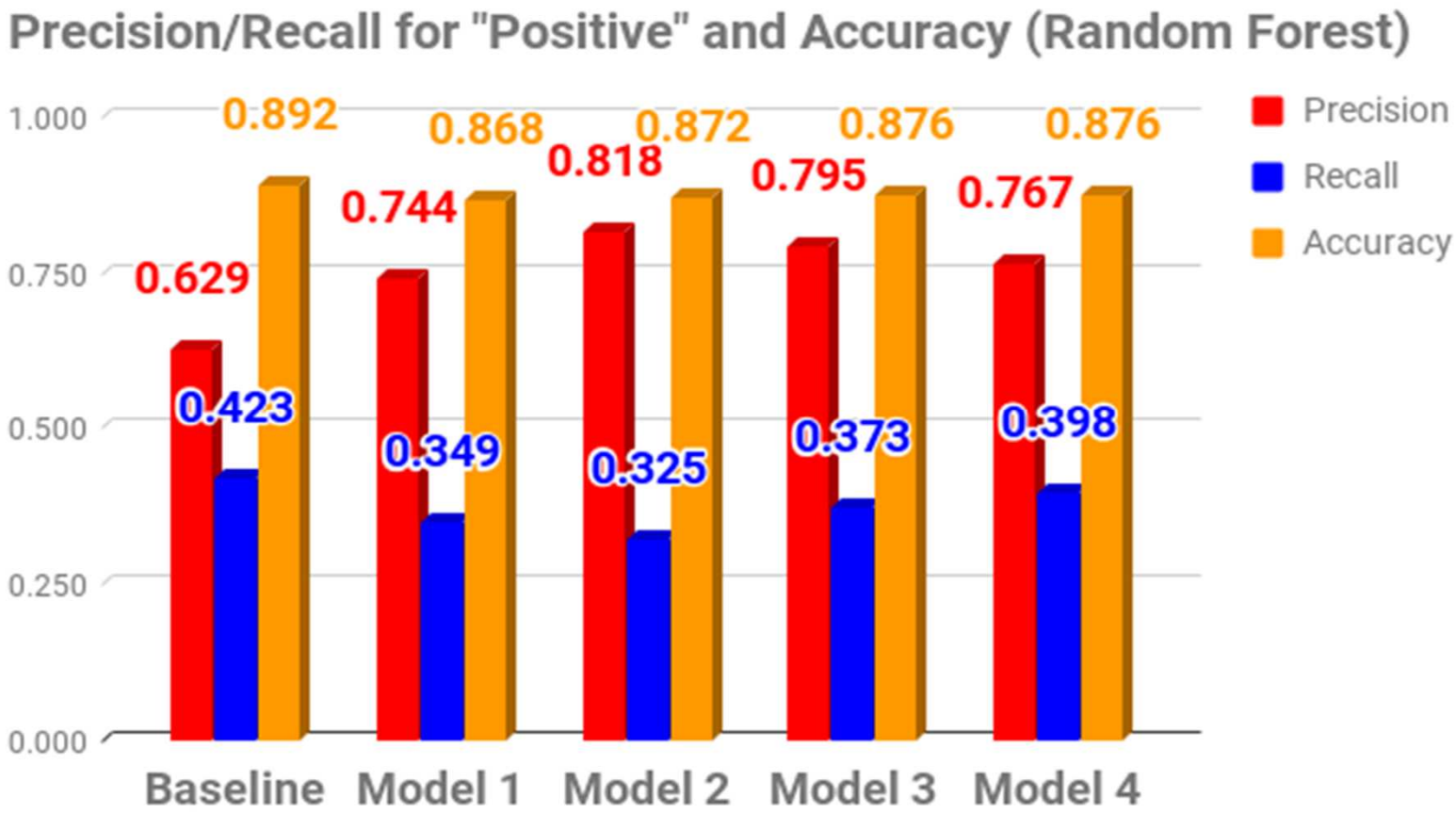
Experimental Framework: eRisk Data and Weka

CLEF eRisk 2017: early risk prediction of depression from data extracted from **Reddit** (american social news aggregation, web content rating, and discussion website.)

Training: 403 Non-depressive + 83 Depressive
Testing: 349 Non-depressive + 52 Depressive

D. Losada, F. Crestani. *A Test Collection for Research on Depression and Language Use*. Conference and Labs of the Evalutation Forum (CLEF), 2016

RESULTS



Model 1: Baseline + Group 1: Language Style;
Model 2: Features of Model 1 + Group 2: Self-Preoccupation;
Model 3: Features of Model 2 + Group 3: Reminiscence and Relevant Words;
Model 4: Features of Model 3 + Group 4: Sentiment and Emotion.

I. A. Malam et *al*, *Location Extraction from Tweets*, CLEF 2017

ML FOR DETECTING LOCATION

Jamie Fox tonight in **Budapest** waiting for someone to jump off the 4th floor of a building.

CONTAIN a LOCATION

If you love **NY**, watch this video and take action against

Predicting and recognizing location names in tweets

ML for Detecting Location

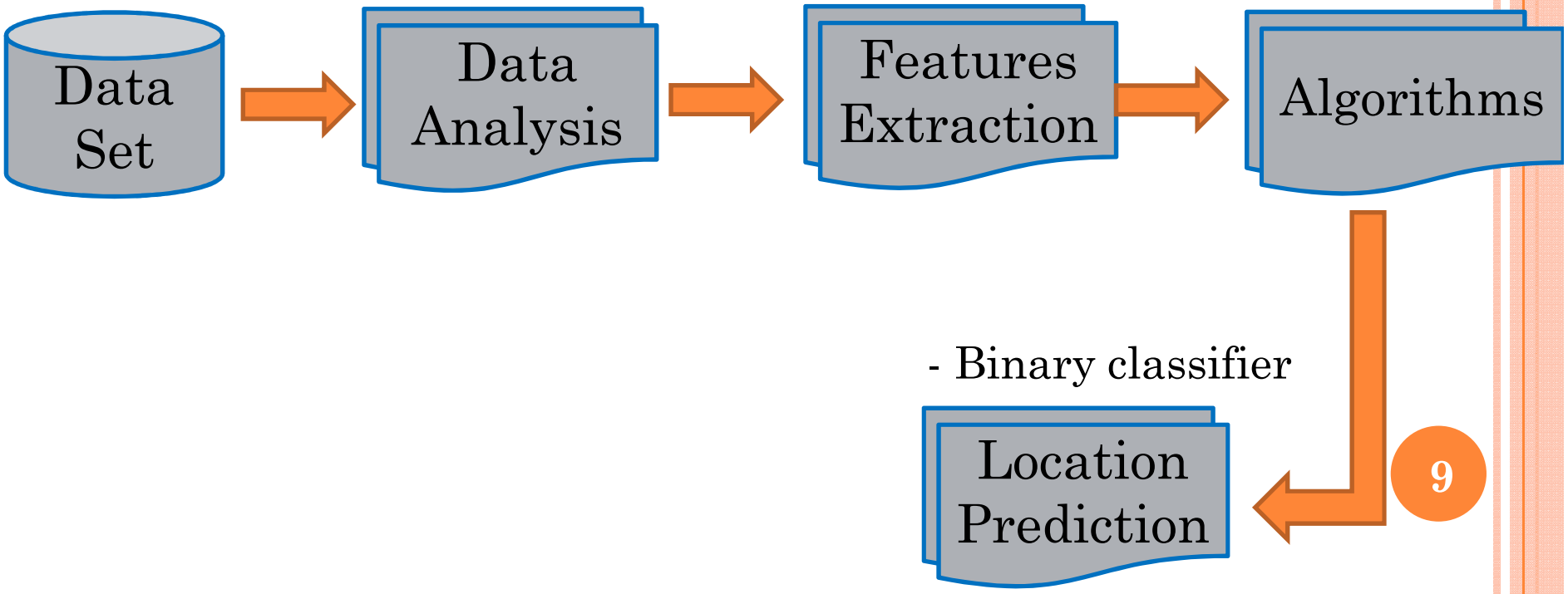
Predictive model

- Twitter posts

- Observability

- Contain a word appearing in geography gazetteer.
- Contain preposition right before proper nouns.
- ....

- RF
- SVM
- NB
- ...



ML for Detecting Location

- **Features**
- **Collections**
  - **Existing** (Ritter's; MSM2013)
  - **New** (1% tweet)
- **ML:** Naïve Bayes, SVM, Random Forest
- **Results**
  - **Accuracy: from 84 % to 94% (prediction of occurrence)**
  - **Increases accuracy of location extraction**
- **Current: predict diffusion**

Thi Bich Ngoc Hoang, Josiane Mothe,
Location Extraction from Tweets
IPM (submitted) 2017

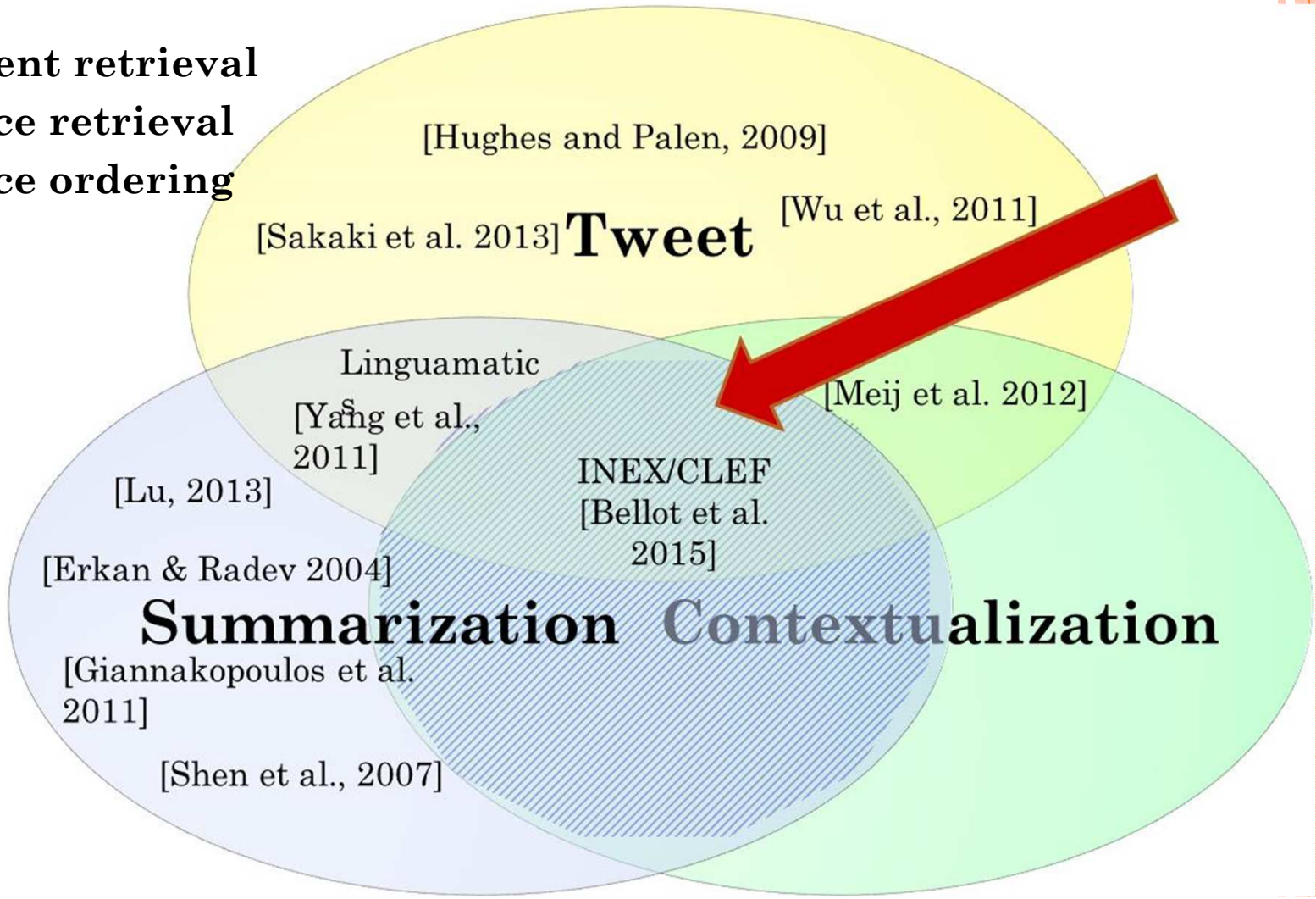
Research Topics

- Learning from Social Media
- **Contextualization**
  - **Developed a CLEF task 2011-> now**
  - **Aim: provide context to help short text understanding**
  - **Collection: 1,000 tweets + Wikipedia**
  - **Mean: multi-document summarization**
  - **Evaluation: informativeness & readability**
  - **Outcome and main results**

Patrice Bellot et al.
INEX Tweet Contextualization task: Evaluation, results and lesson learned.
IPM 52(5):801-819, 2016

CONTEXTUALIZATION

- **Method**
  - **Document retrieval**
  - **Sentence retrieval**
  - **Sentence ordering**



CONTEXTUALIZATION

- **Contribution**
  - **Sentence weighting using many parameters**
    - **Content**
    - **Syntax**
    - **Dependences**
  - **Graph theory to order sentences**
  - **Topic/comment model**

Research Results

- **Trust in information**
  - How trust in Wikipedia evolves: a survey of students aged 11 to 25
    Josiane Mothe, Gilles Sahut
- **Event dissemination**
  - News Dissemination on Twitter and Conventional News Channels
    A Seth, S Nayak, J Mothe, S Jadhay
- **Detecting changes in behaviour**
  - Early detection of depression (CLEF e-risk 2017)
    F. Benamara, Z. He, J. Mothe, V. Moriceau, F. Ramiandriosa,
- **Detection of locations in short messages**
  - Location extraction from tweeter
    T. B. N. Hoang, J. Mothe IPM 2017 (submitted)
- **Short text (tweet) contextualization**
  - Task and collections (CLEF 2011 – 17)
    P. Bellot et al.
    INEX Tweet Contextualization task: Evaluation, results and lesson learned. IPM 52(5):801-819, 2016
  - Propositions
    Liana Ermakova (PhD), CLEF 2015