Ensemble Methods for Personality Recognition

Ben Verhoeven & Walter Daelemans

{Ben.Verhoeven;Walter.Daelemans}@uantwerpen.be

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@clipsua

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Introduction

- Goal:
  - Assign personality profile to author of text

- Applications:
  - Social network analysis
  - User modeling for conversational systems

Personality Profile

Big Five

- **O**penness to experience
- **C**onscientiousness
- **E**xtraversion
- **A**greeableness
- **N**euroticity

Score 0-100 per trait

MBTI (Myers-Briggs Type Indicator)

- Extravert – Introvert
- Thinking – Feeling
- Sensing – iNtuition
- Judging – Perceiving

Dichotomy with score 0-100

->all treated as binary classes

Previous Research

- Data
  - Different genres: essays, stream-of-consciousness text, social network text
  - Online personality test by authors

- Shared task on computational personality recognition (WCPR 2013)

Personality Test

I see myself as someone who...

1. ...Is talkative

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

2. ...Tends to find fault with others

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

3. ...Does a thorough job

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

4. ...Is depressed, blue

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

5. ...Is original, comes up with new ideas

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

6. ...Is reserved

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

7. ...Is helpful and unselfish with others

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

8. ...Can be somewhat careless

Strongly Disagree 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ Strongly Agree

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Previous Research

Big Five
- Stream-of-consciousness text
  - Mairesse et al. (2007)
  - WCPR 2013
- Social network text
  - WCPR 2013

MBTI
- Personae corpus (essays)
  - Luyckx & Daelemans (2008)
  - Noecker, Ryan & Juola (2013)

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Previous Research

Variability in results:

- Depending on method
- Depending on data/genre
- Depending on trait

Hypothesis

An ensemble of classifiers can improve the performance of personality classification by using information from datasets from different genres, different personality classification systems, possible even different languages

Ensemble Method

- Meta-learner

Combines input features with meta-features (outputs of several component classifiers on that input)

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Experimental Setup
Data

- Data from WCPR shared task
  - Stream-of-consciousness text (ESSAYS)
  - Social network data (FB)
    - Data transformed to larger instances by concatenating 20 posts with identical personality traits
    - 509 instances

- Task
  - Predictions on FB dataset using 60%-40% train-test split

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Experimental Setup
System Specifications

- Features
  - 2000 most frequent character trigrams (mft)
  - 10 meta-features: predicted classes by two component classifiers for each trait
- ML Algorithm
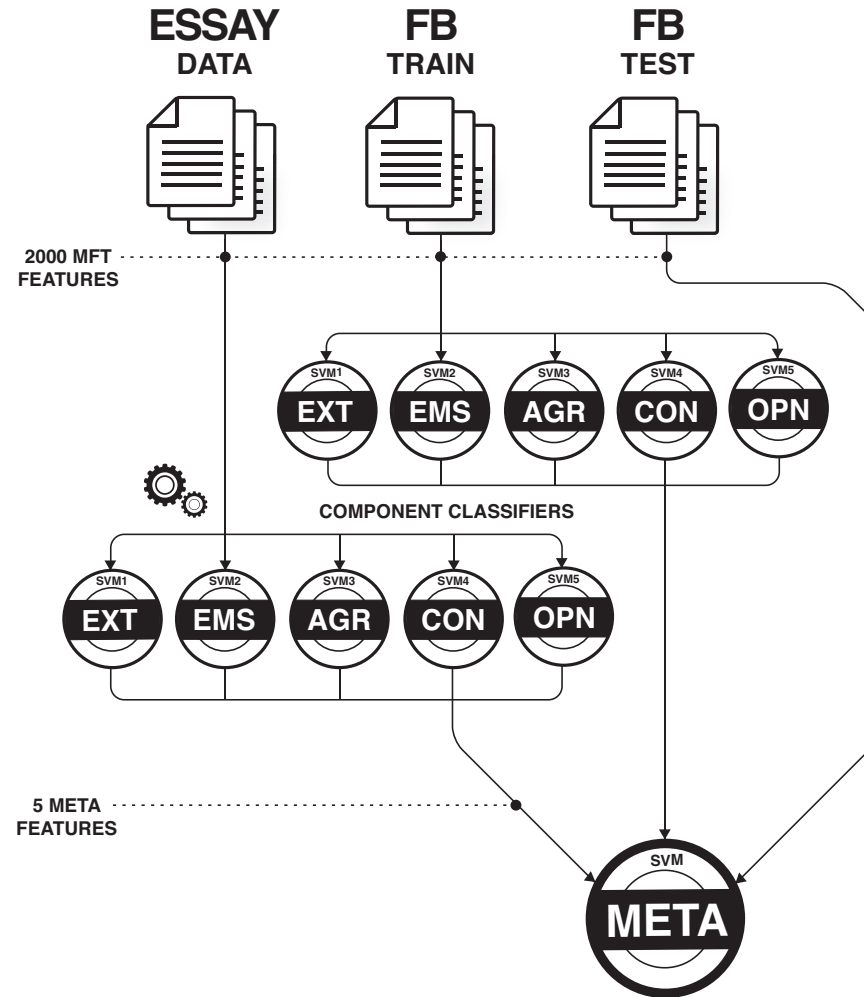 - Weka's SVM implementation (SMO)

Experimental Setup
System Specifications

- Component classifiers

  (Two variants for each trait)

  - 5 classifiers trained on FB train split generate predicted classes for each train instance, using tenfold cross-validation
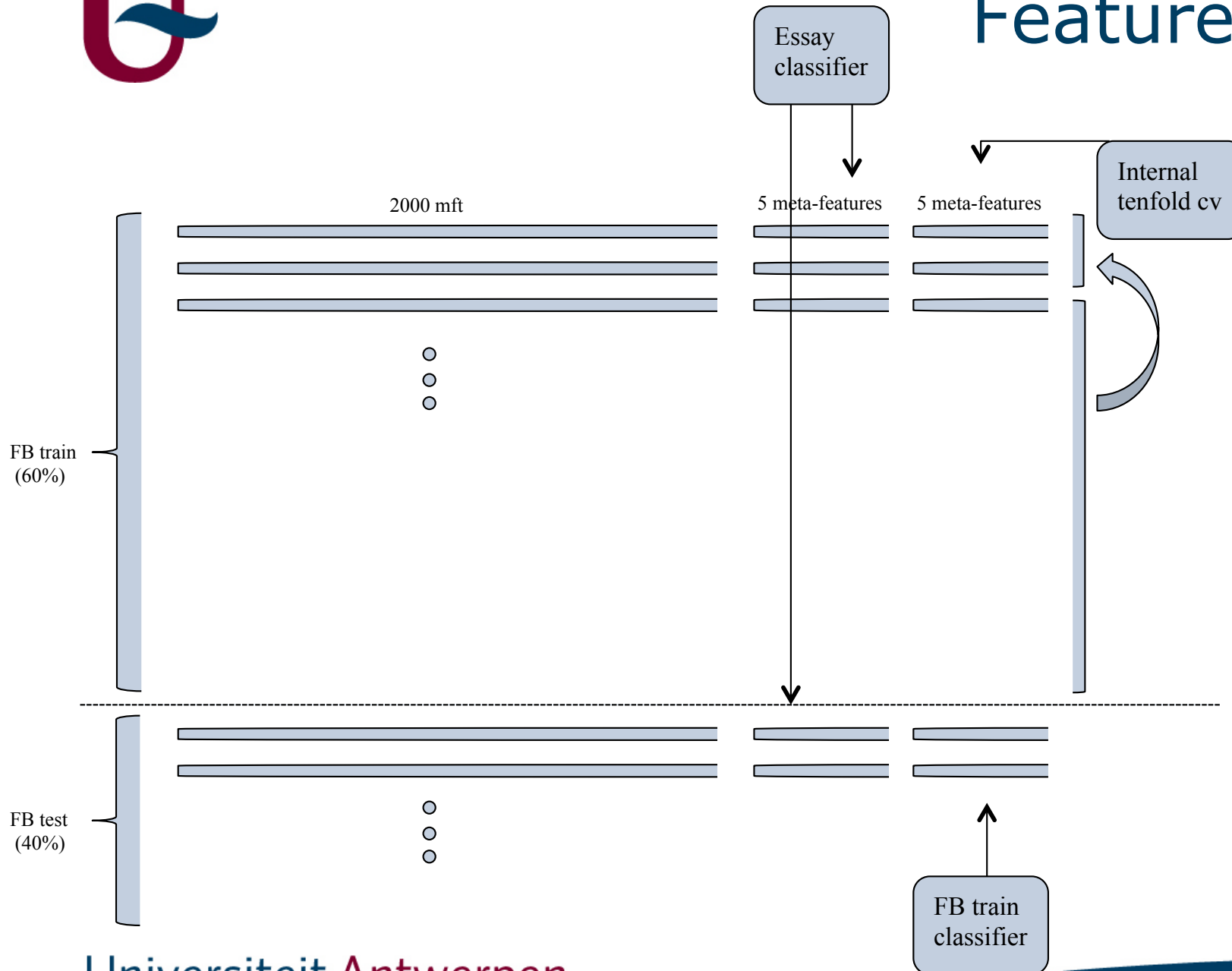 - 5 classifiers trained on 2000mft of essays data

Experimental Setup
Ensemble Architecture

Simple Systems

Trait	Precision	Recall	F-score	WRB
EXT	0.76	0.77	0.76	0.51
NEU	0.67	0.68	0.66	0.53
AGR	0.67	0.68	0.67	0.50
CON	0.66	0.66	0.66	0.50
OPN	0.82	0.83	0.82	0.59

1. Results of classifiers trained on FB data (only 2000 mft) using train and test split. WRB is the weighted random baseline

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Simple Systems

Trait	Precision	Recall	F-score	WRB
EXT	0.70	0.70	0.70	0.51
NEU	0.63	0.64	0.63	0.53
AGR	0.62	0.62	0.62	0.50
CON	0.58	0.58	0.58	0.50
OPN	0.75	0.72	0.73	0.59

2. Results of classifiers using both the essay data and the FB train split as training data (2000 mft), while testing on FB test split

Results

Trait	Precision	Recall	F-score	Baseline	WRB
EXT	0.79	0.79	0.79	0.76	0.51
NEU	0.71	0.72	0.70	0.66	0.53
AGR	0.67	0.68	0.67	0.67	0.50
CON	0.72	0.72	**0.72**	0.66	0.50
OPN	0.87	0.87	**0.86**	0.82	0.59

Results of ensemble classifier on FB test split, using 2000 mft and 10 meta-features. Statistically significant results (calculated in comparison with simple system 1) are in bold.

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Trait	Precision	Recall	F-score	Baseline	WRB
EXT	0.74	0.74	0.74	0.76	0.51
NEU	0.68	0.69	0.68	0.66	0.53
AGR	0.70	0.70	0.70	0.67	0.50
CON	0.74	0.74	0.74	0.66	0.50
OPN	0.85	0.85	0.85	0.82	0.59

Results of ensemble classifier on FB test split, using only 10 meta-features.

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Discussion

- Concept of ensemble methods for personality recognition
  - Considered proven, with remarks
- Extension of approach remains to be proven
  - Methodology (complete 10-fold cv)
  - MBTI
  - Translated corpora

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Thank you!

For suggestions and/or questions:

Ben Verhoeven & Walter Daelemans
CLiPS – Computational Linguistics Group
University of Antwerp

{Ben.Verhoeven;Walter.Daelemans}@uantwerpen.be

CLiPS
Computational Linguistics & Psycholinguistics
University of Antwerp

@clipsua