

Exploiting Textual and Numerical Data to Improve Predictive Models for Depression



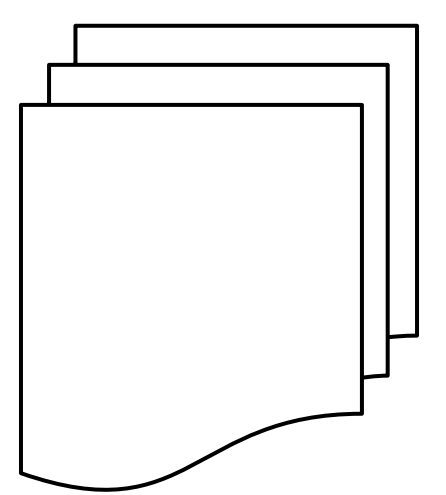
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A large body of text collected from an Internet-based treatment for adults with depressive symptoms

patients are evaluated and assigned CES-D (depression) scores

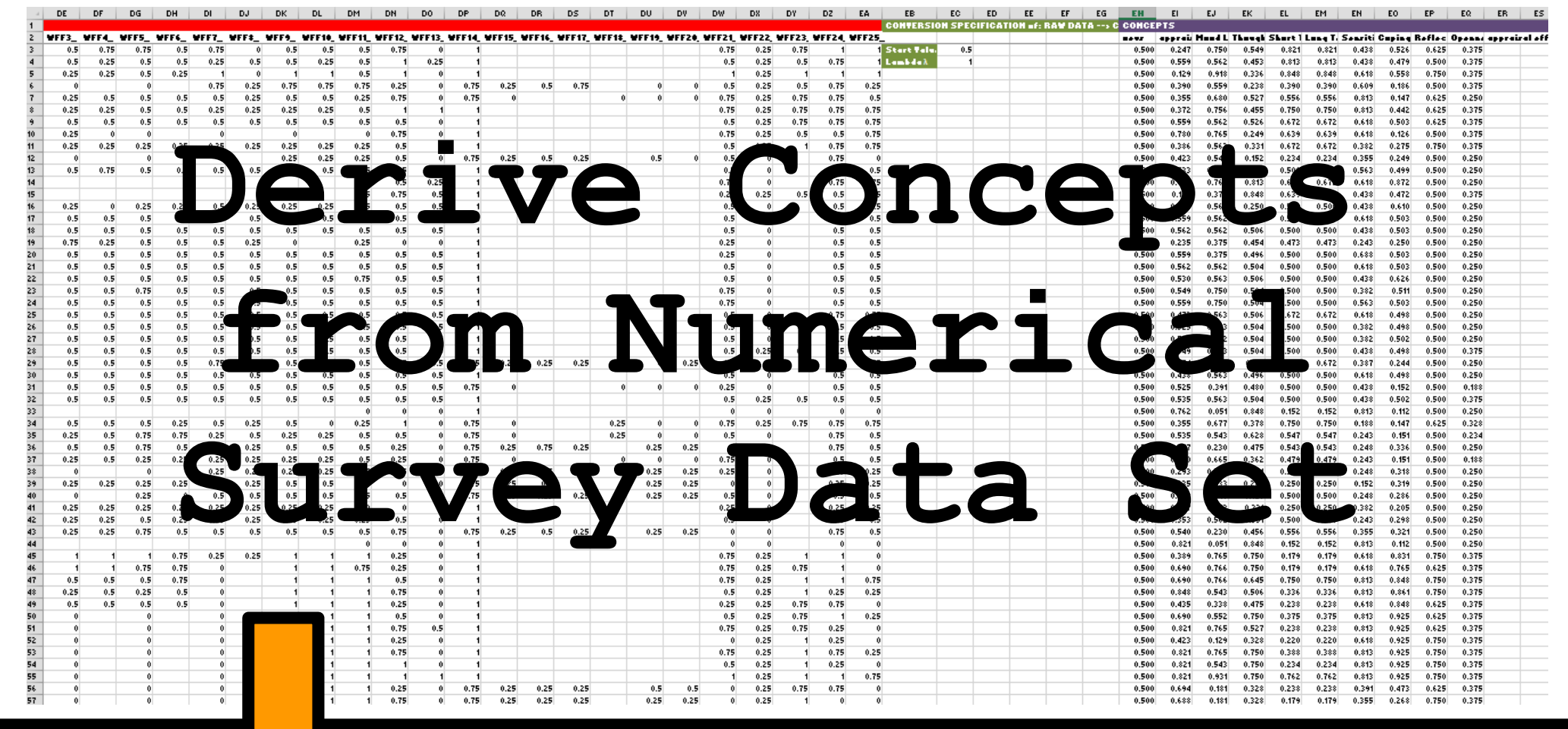
3	condition	group
4	age	age in years
5	gender	gender
6	education	highest education
7	T0cesdTOT	CESD baseline
8	T1cesdTOT	CESD after 5 weeks (after PST)
9	T2cesdTOT	CESD after 8 weeks (after CBT)
10	T3cesdTOT	CESD after 12 weeks
11	T4cesdTOT	CESD after 9 months
12	T0hadsTOT	anxiety baseline
13	T1hadsTOT	anxiety 5 weeks
14	T2hadsTOT	anxiety 8 weeks
15	T3hadsTOT	anxiety 12 weeks
16	T4hadsTOT	anxiety 9 months
17	t0qual	quality of life baseline
18	t1qual	quality of life 5 weeks



learn a model that predicts the level of depression using sentiment analysis tools and techniques



- SVM (support vector machines)
- Naive Bayes
- Dutch stopwords and stemmers
- word presence vs. frequency
- ...



Derive Concepts from Numerical Survey Data Set

Tune model parameters

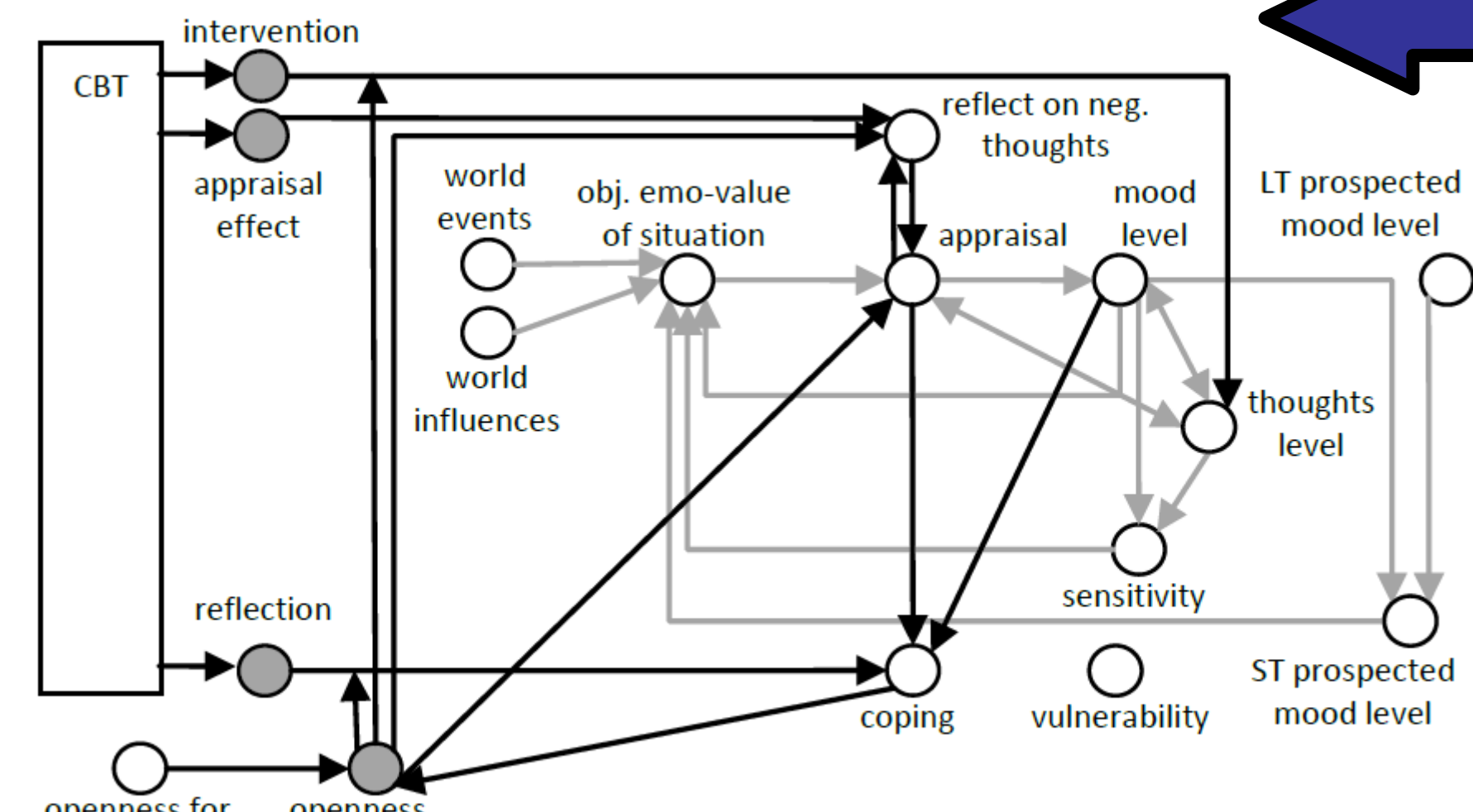
Compare three methods

1. **Initial learning period:** Train on pre-intervention week only
Or incorporate both weeks
2. Tune a **global parameter** set based on most subjects.
3. **Nearest neighbour:** single parameter set per subject

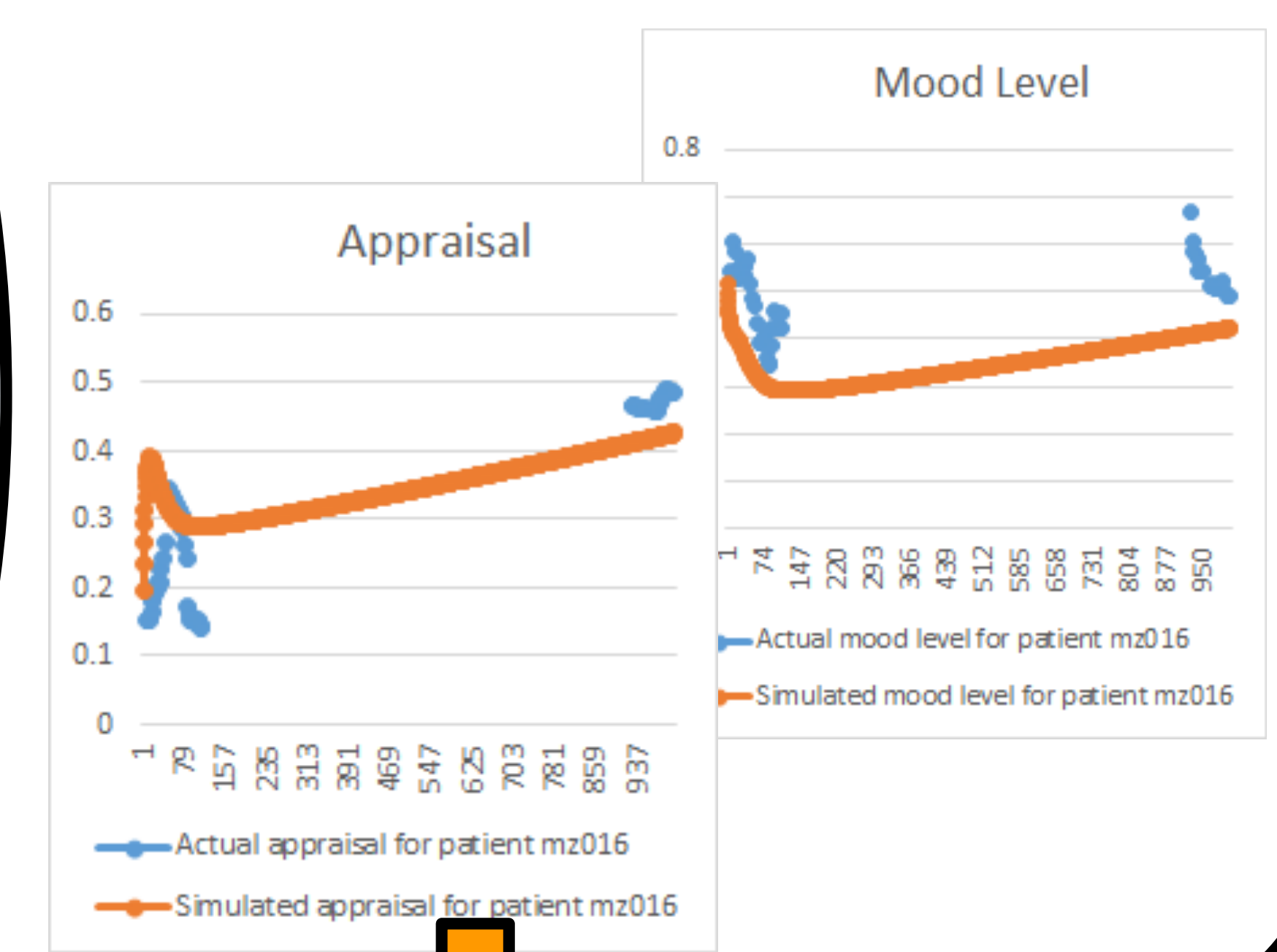
Evaluation and comparison of techniques

- Some techniques tend to consistently outperform others w.r.t. accuracy: SVM produces better results than Naive Bayes.
- Max. achieved accuracy is still under 80% (78%) - further experimentation with features and techniques is required.

Mood prediction model



Validation...



Future Work

1. Applying classifier to general text. Using frequency profiling to compare body of text to other corpora. Use improved text classifier to produce input for the mood prediction model.
2. Deeper investigation regarding individualizing parameters for this specific model.
3. Investigate if other/improved clustering algorithms make a difference

Validated! This means...

1. Incorporating post-intervention survey weeks from other historical patients is beneficial
2. Individualizing parameter sets can be beneficial in some cases

Acknowledgements

- Numerical Data Set: Prof. Berking & Anna Radkovsky (University of Marburg)
- Textual Data Set: Lisanne Warmerdam (VU University Amsterdam)

Bibliography

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3. L. S. Radloff, "The CES-D Scale: A Self-Report Depression Scale for Research in the General Population.," *Applied Psychological Measurement*, vol. 1, no. 3, pp. 385-401, Jun. 1977.