Mathematical Underpinnings of Machine Learning

Project checkpoint

Authors: Izabela Telejko, Grzegorz Zbrzeżny   May 2024

1 Topic

We chose project A - Feature Selection, based on [2].

2 Progress

We are implementing the following methods using information theory measures:

- JMIM (Joint Mutual Information Maximisation) [1],

- IGFS (Interaction Gain Feature Selection) [3],

- CMIM (Conditional Mutual Information Maximization) [4].

Moreover we will implement two arbitrary methods for the comparison, namely:

- Feature Selection based on AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion),

- Tree-based Feature Selection.

As for the methods evaluation we will generate few datasets with known set of significant features with added a set of irrelevant features. Apart from that we will take five datasets from UCI repository[1] on which we will also make comparison of the methods results.

References

[1] M. Bennasar, Y. Hicks, and R. Setchi. Feature selection using joint mutual information maximisation. *Expert Systems with Applications*, 42(22):8520–8532, 2015.

[2] G. Brown, A. Pocock, M.-J. Zhao, and M. Luján. Conditional likelihood maximisation: A unifying framework for information theoretic feature selection. *Journal of Machine Learning Research*, 13(2):27–66, 2012.

[3] A. El Akadi, A. Ouardighi, and D. Aboutajdine. A powerful feature selection approach based on mutual information. 8, 01 2008.

[4] F. Fleuret. Fast binary feature selection with conditional mutual information. *J. Mach. Learn. Res.*, 5:1531–1555, dec 2004.

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[1] https://archive.ics.uci.edu/