Streszczenie rozprawy doktorskiej mgr. Maryii Shpak

pt. **"Structure Learning and Parameter Estimation for Graphical Models via Penalized Maximum Likelihood Methods"**

Probabilistic graphical models (PGMs) provide a compact and flexible framework to model very complex real-life phenomena. They combine the probability theory which deals with uncertainty and logical structure represented by a graph which allows to cope with the computational complexity and also interprete and communicate the obtained knowledge. In the thesis we consider two different types of PGMs: Bayesian networks (BNs) which are static, and continuous time Bayesian networks which, as the name suggests, have temporal component. We are interested in recovering their true structure, which is the first step in learning any PGM. This is a challenging task, which is interesting in itself from the causal point of view, for the purposes of interpretation of the model and the decision making process. All approaches for structure learning in the thesis are united by the same idea of maximum likelihood estimation with LASSO penalty. The problem of structure learning is reduced to the problem of finding non-zero coefficients in the LASSO estimator for a generalized linear model. In case of CTBNs we consider the problem both for complete and incomplete data. We support the theoretical results with experiments.

Keywords and phrases: Probabilistic graphical models, PGM, Bayesian networks, BN, continuous time Bayesian networks, CTBN, maximum likelihood, LASSO penalty, structure learning, Markov Jump Process, MJP, Markov chain, Markov chain Monte Carlo, MCMC, Stochastic Proximal Gradient Descent, drift condition, incomplete data, Expectation-Maximization, EM.

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