Course project proposal.

1) **Project name**
   Overlapping community detection in graphs.
2) **Team and tasks**
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   There are a lot of methods of community detection in graphs and everyone in our team will implement one algorithm and will compare it with others.

3) Background
   This is an actual problem which is used in network sciences. Dealing with big graphs we should implement effective NLA methods to compute it fast. In particular algorithms matrix factorization are required.
4) Problem formulation
   In social networks which can be described via graph structure we need to find communities for different purposes.
   For each purpose there are several definitions of communities and different algorithms are needed.
5) Data
   We will use graphs from social networks for tests and artificially generated graphs also.
6) Overlapping Community Detection using Bayesian Nonnegative Matrix Factorization
   http://www.orchid.ac.uk/eprints/38/1/PRE_NMF.pdf
   Overlapping Community Detection at Scale: A Nonnegative Matrix Factorization Approach
   http://cs.stanford.edu/people/jure/pubs/bigclam-wsdm13.pdf
   A Tensor Approach to Learning Mixed Membership Community Models
   http://www.cs.columbia.edu/~djhsu/papers/community-jmlr.pdf
   Mixed Membership Stochastic Blockmodels
   http://jmlr.csail.mit.edu/papers/volume9/airoldi08a/airoldi08a.pdf
7) Scope
   As a result we will have 4 implemented methods and the comparison of this data on real graph.
8) Evaluation
   Time and quality of community detection