

# DD2434 Projects

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## Abstract

The task of the project is to reproduce the results presented in a published scientific article, describe the article orally and in written form to your peer students, and argue for and against the method presented in the article. From this you will learn how to read scientific articles, how to implement and use a particular method, how to argue for and against a method, and how to adapt the presentation of a method to different target groups (i.e., adapt the presentation of the method in the article - targeted to active researchers in Machine Learning - so that it is understandable to first year Master students in Machine Learning).

The below 3 papers represent a range of different topics in Machine Learning, and have been selected by Hedvig, who will be the supervisor of these projects.

Some of the papers are more theoretical and while others are of a more practical nature. The requirements will change accordingly, so if you pick a more practical paper you will need to perform more experiments while a more theoretical paper requires you to show a more thorough analysis of the paper.

Detailed instructions about the project can be found on the course home page, Project in the menu to the left.

## 1 Graphical Models

L. Breiman. “Random Forests”. In: *Machine Learning* 45.1 (2001), pp. 5–32

The original Random Forests paper. Random Forests are used in diversity of applications; a recent application is the Microsoft person tracker. For this project, it is an advantage that some group members have taken a Machine Learning basic course.

## 2 Approximative Nearest Neighbor

A. Gionis *et al.* “Similarity search in high dimensions via hashing”. In: *VLDB Conference*. 1999

Exakt kNN becomes intractable for very large N. Locality Sensitive Hashing is a principled approximation to exact kNN, which pre-organizes the state space so as to restricting the neighbor search to a small subset of the space.

## 3 Representation Learning

S. Mika *et al.* “Kernel PCA and de-noising in feature spaces”. In: *Advances in Neural Information Processing Systems* 10. 1998

The original Kernel PCA paper. Kernel PCA is a widely used non-linear extension of PCA, also briefly covered in the course book by Bishop.

## References

- L. Breiman. “Random Forests”. In: *Machine Learning* 45.1 (2001), pp. 5–32.
- A. Gionis *et al.* “Similarity search in high dimensions via hashing”. In: *VLDB Conference*. 1999.
- S. Mika *et al.* “Kernel PCA and de-noising in feature spaces”. In: *Advances in Neural Information Processing Systems* 10. 1998.