Machine learning project (Weather Prediction)

Introduction:

The Machine Learning project aims to analyze weather data to build predictive models. It requires performing a classification and a regression task, utilizing various ML algorithms. The project also includes an ensemble learning component and a survey on kernel methods in Machine Learning, specifically in the context of Support Vector Machines (SVMs).

Problem Statement:

The project involves predicting outcomes based on weather conditions, using a dataset that describes various attributes such as temperature, humidity, and ui index. The primary challenge is to accurately classify and predict specific weather outcomes and test ensemble models for performance improvement. Additionally, understanding the role of kernels in SVM is necessary to grasp advanced ML concepts

Goals:

- Perform both classification and regression on weather data.
- Implement ensemble learning methods, such as Random Forest and Voting Classifier, to improve classification accuracy.
- Conduct a technical survey on the use of kernels in SVM, addressing historical background, motivations, types of kernels, and the selection criteria for different ML problems.

Related Work:

The project references established ML techniques, particularly in SVM and ensemble learning. It points to foundational resources, such as: • Stanford CS229: Machine Learning (Autumn 2018) Andrew Ng lecture about SVM and kernels. Slides here: read till section 6 Kernel Methods, live lecture notes: http://cs229.stanford.edu/notes2020fall/notes2020fall/cs229-notes3.pdf, full course if

interested: http://cs229.stanford.edu/syllabus-spring2021.html • Learning from data: Learning from Data - Online Course (MOOC) by Prof Yasser AbuMostafa: https://home.work.caltech.edu/telecourse.html a. VC dimension: lecture 7 b. SVM and Kernels: lectures 14 & 15. • This is a complete course about kernels with slides and videos: Machine learning with kernel methods, 2021. https://members.cbio.mines paristech.fr/~jvert/svn/kernelcourse/course/2021mva/index.html First 4 lectures • The concept of a hilbert space and inner products: Inner Products in Hilbert Space https://www.youtube.com/watch?v=g-eNeXlZKAQ