

Day 1: Introduction to Machine Learning and Clustering (1/22):

The first session commenced with an overview of machine learning, emphasizing its reliance on data and its diverse applications, including chatbots and image creation through diffusion models. The historical journey from checker games to concepts like perceptrons, IBM Deep Blue, and AlphaGo provided valuable context. A focus on clustering during unsupervised learning, particularly k-means clustering and k-means++, was complemented by practical exercises involving customer classification using actual bank datasets.

Day 2: Classification and Model Exploration (1/23):

The second day delved into classification, elucidating concepts such as true positives, true negatives, false positives, and false negatives. The practical Jupyter notebook sessions covered perceptrons, logistic regression, decision trees, and KNN. The 'No free lunch theory' was introduced, underscoring the need for adaptable models. The challenges of overfitting and underfitting, L2 regularization, and the comparison of encoding methods enriched the learning experience.

Day 3: Model Evaluation and Validation (1/24):

The third day introduced various model evaluation techniques, emphasizing the importance of the pipeline function. Concepts like overfitting, underfitting, and the role of a validation dataset were explored. K-fold cross-validation, strategies for handling bias and variance, and the impact of regularization on model robustness were thoroughly covered. The day also included an introduction to text classification and Naive Bayes, highlighting the challenges posed by text data compared to numerical data.

Day 4: Neural Networks and Feature Engineering (1/25):

The fourth day commenced with an exploration of neural networks, incorporating concepts like bias, activation functions, cost functions, and epochs. The significance of feature engineering in obtaining non-linear results even with linear activation functions was highlighted. Practical exercises involved classifying the MNIST image dataset using a feedforward neural network. The afternoon session focused on feature engineering, stressing its impact on model accuracy and execution time.

Day 5: Ensemble Learning and Ethical Considerations (1/26):

The final day with Daniel introduced ensemble learning, emphasizing the benefits of combining results from multiple models. Hard voting, soft voting, bagging, and concepts like Random Forest and Adaboost were covered, showcasing the power of ensemble methods. After exercise, I listened to Professor Marianne's 'bias and fairness in AI'. We were able to think about what we should be careful about when using artificial intelligence and what ethical problems there are. After lunch, I was able to visit the Liebherr company and find out what kind of company it is and how to use it. The artificial intelligence in the form of a chatbot felt similar to the DASU, and I was able to gain enthusiasm for capstone activities by watching the artificial intelligence that took care of the inside of the refrigerator.

Conclusion:

The week-long machine learning lecture provided a comprehensive understanding of various concepts and applications, ranging from fundamental clustering and classification to advanced

topics like neural networks and ensemble learning. Practical exercises and real-world examples enhanced the learning experience, and ethical considerations emphasized the responsibility that comes with leveraging AI technologies. Overall, the lecture laid a strong foundation for further exploration and application of machine learning in diverse fields.