Übersicht SMD

Table of Contents

[Inhaltsverzeichnis der Vorlesung 2](#_Toc133913271)

[Übungszettel 3](#_Toc133913272)

# Inhaltsverzeichnis der Vorlesung (Folien)

1. **Numerical Foundations**
   1. Motivation
   2. Arithmetic Expressions
   3. Data Representation on Computers
   4. Rounding and Error Propagation
   5. Stability and Condition
2. **Probability**
   1. Probability Definitions
   2. 1D – Distributions
      1. Probability Distribution, CDF and PDF
      2. Moments
      3. Measures of Central Tendency and Dispersion
   3. Common 1D – Distributions
      1. Discrete Distributions
      2. Continuous Distributions
3. **Random Number Generation**
   1. Motivation
   2. Generation of equally distributed random numbers
   3. Testing randomness
   4. Transformation of the uniform distribution
   5. Rejection Sampling
4. **Monte Carlo Methods**
   1. Importance Sampling
   2. Markov Chain Monte Carlo
   3. Monte Carlo Simulatins
5. **Multivariate Distributions**
   1. Two-dimensional distributions
   2. Multivariate distributions
   3. Two-dimensional Gaussian distribution
   4. Theorems and propositions
6. **Data Mining Part 1**
   1. Data Mining
   2. Typical Exercises in Data Mining
7. **Data Mining Part 2**
   1. Linear classification
   2. Neural networks

# Inhaltsverzeichnis der Vorlesung (Notebooks)

1. **Boosting**
   1. M
2. **Handson Fitting**
   1. P
3. **PCA**
   1. M
4. **Supervised**
   1. I
5. **Unsupervised**
   1. T
6. **Neural Networks**
   1. D
7. **Neural Networks Torch**
   1. L

# **Übungszettel**

1. 1. Numerical stability 4 p.
   2. Numerical stability and condition 6 p.
2. 1. Dice 4 p.
   2. Maxwell velocity distribution 6 p.
3. 1. Random number generator *(Project)* 5 p.
   2. Uniform distributions *(Project)* 5 p.
4. 1. Angle distribution *(Project)* 5 p.
   2. Multiple scattering *(Project)* 5 p.
5. 1. Simulation chain for neutrino detector *(Project)* 10 p.
6. 1. Fisher-Discriminant: By Hand 3 p.
   2. Fisher-Discriminant: Implementation 7 p.
7. 1. Principal Component Analysis (PCA) by hand 5 p.
   2. Principal Component Analysis (PCA) 5 p.
8. 1. Naive Bayes: Soccer 5 p.
   2. Binary Decission Tree: The First Decission 5 p.
9. 1. Feature Generation *(Project)* 5 p.
   2. Energy Regression *(Project)* 5 p.
10. 1. 𝑘-NN Classification 4 p.
    2. kMeans by Hand 6 p.
11. 1. Deep Learning Short Questions 4 p.
    2. Linear Classification using Softmax 6 p.