Scientific Data Computing

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Outline

- Monday 10-12, Liivi 2-207
- Monday 12-14, Liivi 2-205
- Topics
  - Introduction, statistical methods and their applications
  - Linear algebra and higher order singular value decomposition
  - Optimization and adjoints
  - Clustering and applications
  - Compressed sensing
  - Text processing
  - Time series analysis and wavelets
Motivation

- Lorenz equations
Octave

- Introduction to Octave
• Simulating the Lorenz equations in Octave
Probability

- Sample space
- Conditional probabilities
- Independent events
- Baye’s formula
Random variables and statistical concepts

- Discrete vs. Continuous
- Probability density functions
- Cumulative distribution function
- Binomial, Bernoulli, Poisson, Uniform, Exponential and Normal random variables
- Expectation, moments and variance
- Joint probability distribution and covariance
- Octave commands related to probability
Hypothesis testing and statistical significance

- Limit theorems
- Statistical decisions
- Statistical significance
- Hypothesis testing - Student t test, chi-square test, F-test