Lab 10: HMM & NHMM Implementation

2-state HMM implementation, NHMM extensions, climate change scenarios, synthetic weather generation

CEVE 543 Fall 2025

2025-11-07

1 Objectives

1. Implement 2-state Hidden Markov Model from scratch
2. Extend to non-homogeneous HMM with time-varying parameters
3. Apply climate change parameter perturbation strategies
4. Generate and validate synthetic weather sequences for hydrological modeling

2 Before

> ❗ Instructions
>
> Do this before the lab date so that lab itself can go more smoothly.

3 Background and Reading

4 Tasks

Modify the code section below to address the following tasks.

1. Implement 2-state HMM from scratch with EM parameter estimation
2. Extend to non-homogeneous HMM with time-varying transition probabilities
3. Apply climate change parameter perturbation strategies to model projections
4. Generate synthetic weather sequences and validate against observations

5 Code

Bibliography