Dissertation Presentation
Hidden Markov Models for Rainfall Simulation

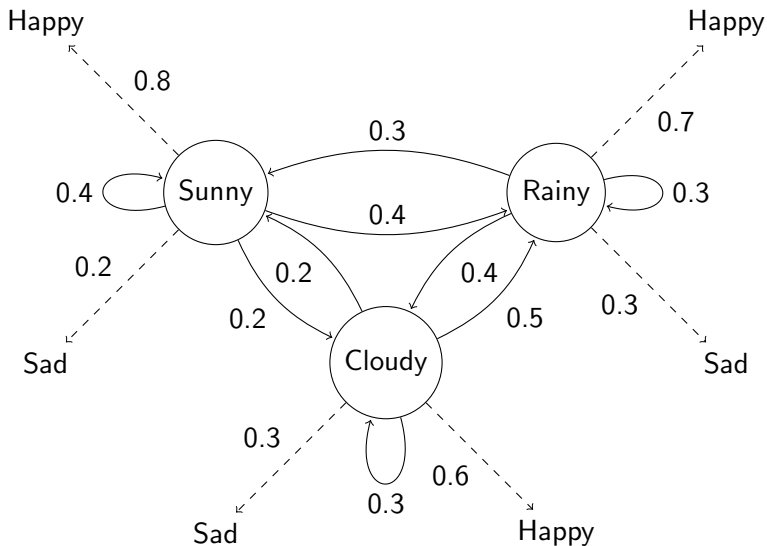183773

University of Sussex

Spring 2021
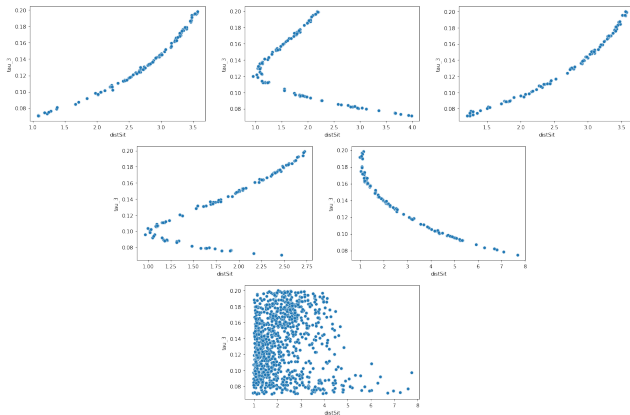
# Outline

Hidden Markov Models

Rainfall Models

Using Grando's
model and fitting
methodology, we
run multiple
attempts on
estimating
parameter τ_3 but
find different
estimates.
The uniform
scatter is for the
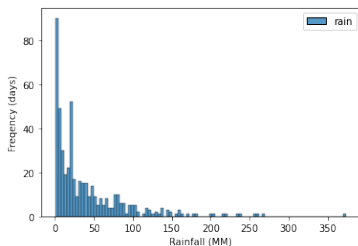adjusted
algorithm.

distSit = normalised Euclidean Distance between sample and simulation
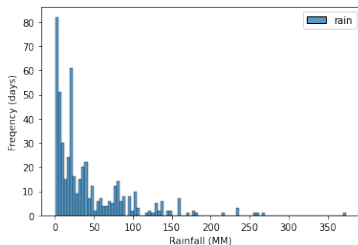
Simple Rainfall HMM

Sample(Top) vs Simulated(Bottom) data Frequencies
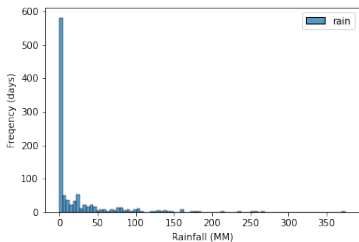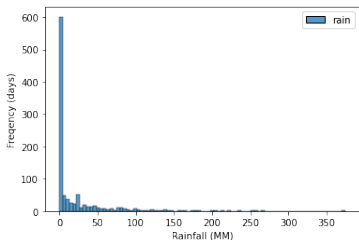
Sample(Top) vs Simulated(Bottom) data Frequencies not including 0mm
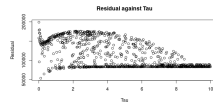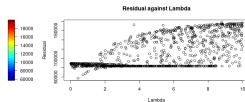

days

Generalised Model

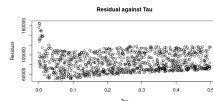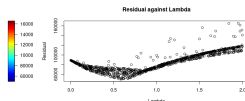First row
$\lambda \in [0, 10]$
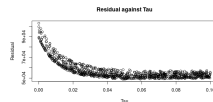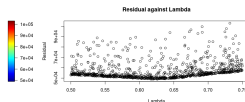$\tau \in [0, 10]$
Second Row
$\lambda \in [0, 2]$
$\tau \in [0, 0.5]$
Third Row
$\lambda \in [0.5, 0.75]$
$\tau \in [0, 0.1]$

Results and Future Research

Kolmogorov–Smirnov tests

- H_0: The two samples are from the same distribution
- H_1: The two samples are not from the same distribution.

Month	Train HMM	Train Gen Model	Test HMM	Test Gen Model
0	0.8593	4.939×10^{-5}	0.7899	4.60×10^{-8}
1	0.9969	0.002038	0.105	5.46×10^{-6}
2	1	2.13×10^{-5}	0.1118	7.65×10^{-7}
3	1	1.79×10^{-6}	0.02163	1.11×10^{-7}
4	0.4324	1.38×10^{-5}	0.0009582	7.98×10^{-8}
5	1	0.006202	0.2979	0.0004948
6	1	1.11×10^{-5}	0.1809	8.53×10^{-8}
7	1	2.13×10^{-5}	0.03555	4.53×10^{-5}
8	0.9999	0.0001108	0.07192	0.001033
9	0.9969	6.06×10^{-5}	5.22×10^{-7}	1.22×10^{-7}
10	0.8879	0.0008667	0.1914	9.07×10^{-5}
11	0.9999	6.06×10^{-5}	0.265	2.15×10^{-6}