Forest Fires: An Analysis of the Initial Spread Index

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Abstract

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1 Introduction

2 Background

The Pacific Northwest has a varied climate, from temperate rainforests on the Pacific coast to desert in Southeastern Oregon, which has a major impact on the seasons. Therefore, each grid cell is classified into one of nine climatic zones as follows:

1. Washington Coastline (Temperate Rainforest)
2. Oregon Coastline
3. Western Washington / Seattle Metropolitan Area
4. Willamette Valley and Southwestern Oregon
5. Cascade Range
6. Columbia Plateau
7. Selkirk Mountains
8. Blue Mountains
9. Eastern Oregon / High Desert / Great Basin

These zones were decided by considering average precipitation over the time period of the data and the topographic features of the region. The rainfall for the region was aggregated by considering if there was measurable rainfall in each grid by day, and then for each day if the majority of grid cells reported rain, then a value of *rain* was assigned to the area, else it was *dry*

3 Model

We further developed our model by considering the probability of rain on each day for the summer (dry) and winter (rainy) seasons. This is motivated by the idea of trying to plan outdoor activity in each area of the Pacific Northwest and deciding if there is value in traveling to a different area to escape rain. Therefore, the following model is proposed:

- The data is binary data representing if it rained or not for each day of the year,
- π_w and π_d are the probability of rain during the wet season and dry season, respectively.
- θ_1 and θ_2 are the cutoff points for the wet and dry seasons. The wet season runs from January 1st until the day before θ_1 and from θ_2 to December 31st, and the dry season runs from θ_1 until the day before θ_2, and the natural restriction is imposed that $\theta_1 < \theta_2$
- Let y_j be the data on day j. Then $p(y_j) = \pi_w 1_{j<\theta_1} + \pi_d 1_{\theta_1 \leq j < \theta_2} + \pi_w 1_{j \geq \theta_2}$

4 Analysis

5 Discussion

6 Conclusion