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EPPS 6323 Spring 25

Knowledge Mining Project Proposal

I. Introduction

Numerous studies have confirmed the incidence of climate change, as evidenced by changes in plant growth, extreme temperatures, and increased rainfall. Many of these studies have focused on critical environmental regions like the Amazon rainforest. While valuable for agriculture and resource planning, insights produced by these studies are difficult to relate to the average person and the urban/suburban regions where they live. On a much smaller geographic and time scale, we experience such changes in our own regional climates as more frequent severe weather events and high temperatures. This project hopes to realize these intuitions about our environment by producing regional climate change insights and illustrating the effects of climate change within a human lifespan, on a regional geographic scale.

II. Research Statement

This project aims to answer the following questions: What patterns exist as microcosms of climate change in the major regions of the United States (Northeast, Midwest, South, and West)? How can we use knowledge mining to estimate and visualize regional weather changes within a human lifetime?

III. Methodology

Data Collection: I plan to web scrape in R (RSelenium) to collect historic weather data and reports from Wunderground and NOAA Climate Data Online. Relevant data will be scraped for selected cities in each of the major U.S. regions over seasonal date ranges from the last 25-50 years.

Data Preparation: Text processing and keyword extraction (tidy, TextRank) will be used to classify temperature and rainfall values for different years. This data will then be used to identify trends in extreme weather frequency, extent, and/or severity.

Analysis & Visualization: I will employ time-series analysis and forecasting in R to evaluate weather changes for significance and predict future weather. Sentiment analysis of weather reports will characterize severity over time. Graphs and maps will be used to visualize weather changes.

Potential Applications: Predictions may inform development plans for major population centers towards heat-reflecting materials and green spaces.