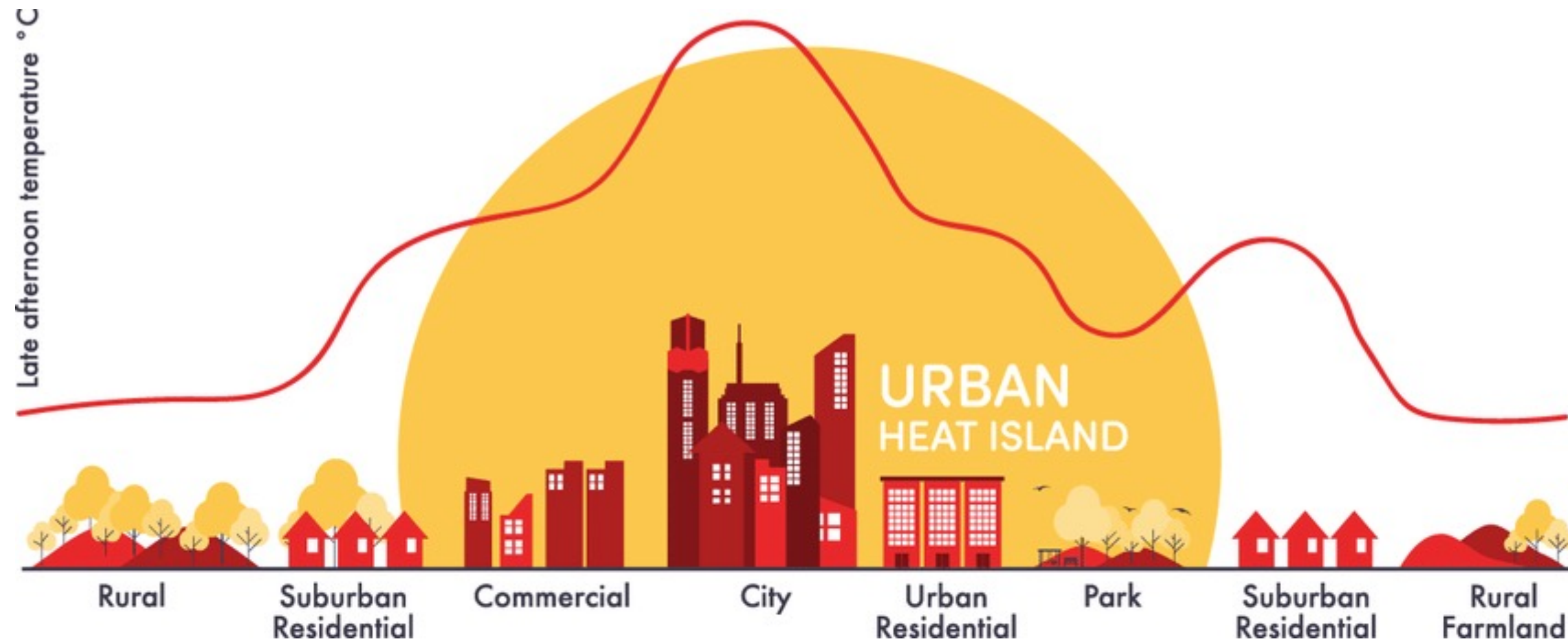


# **Metropolitan Climate Profiling: Advanced Analytics of Urban Heat Islands**

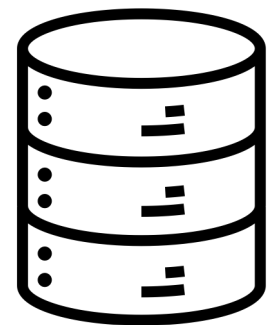


# Urban Heat Islands



A UHI (“Urban Heat Island”) occurs when a city experiences much warmer temperatures than nearby rural areas.

# Workflow



**Problem  
Understanding and  
Definition**

+

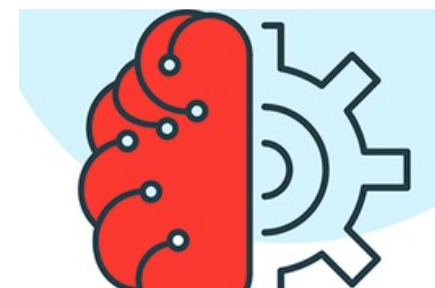
**Data Collection**



**Data  
Preprocessing**

+

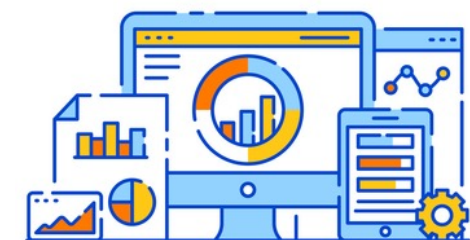
**Exploratory  
Data Analysis**



**Feature  
Engineering**

+

**Dimension  
Reduction**



**Model Training  
& Validation**

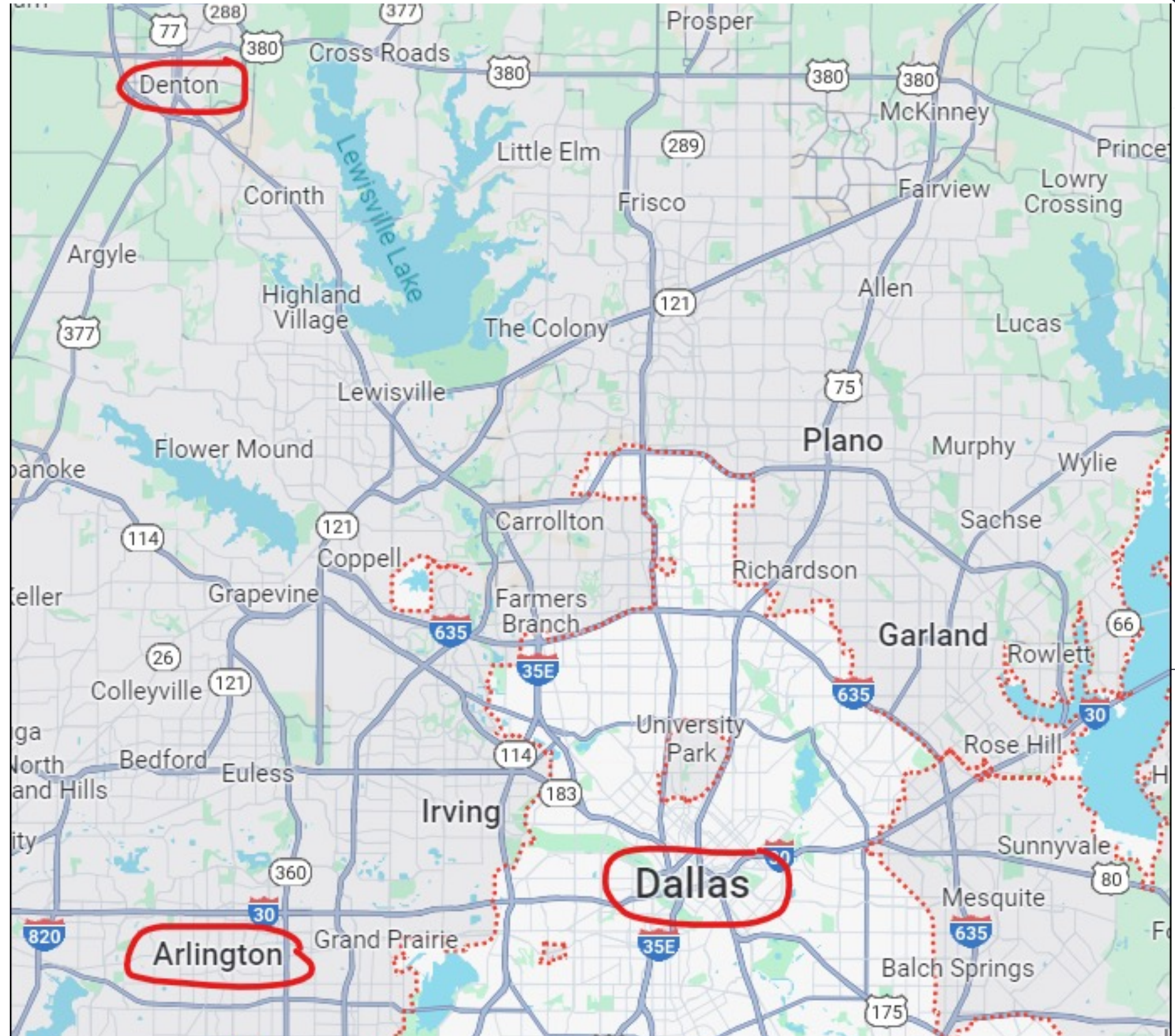
+

**Model Selection**



### 3 Cities for UHI Comparison

**Dallas vs.  
Arlington  
vs. Denton**



# Data Preprocessing and Cleaning

- **Data Aggregation**

This step involved merging various datasets from different cities into a single, consistent format to ensure uniformity across all data points

- **Data Cleaning :**

The focus here was on refining the dataset by identifying and eliminating duplicate entries to enhance data quality.

- **Missing Values Imputation**

In this step, K-Nearest Neighbors (KNN) Imputation technique was employed to accurately fill in missing data in all three datasets.

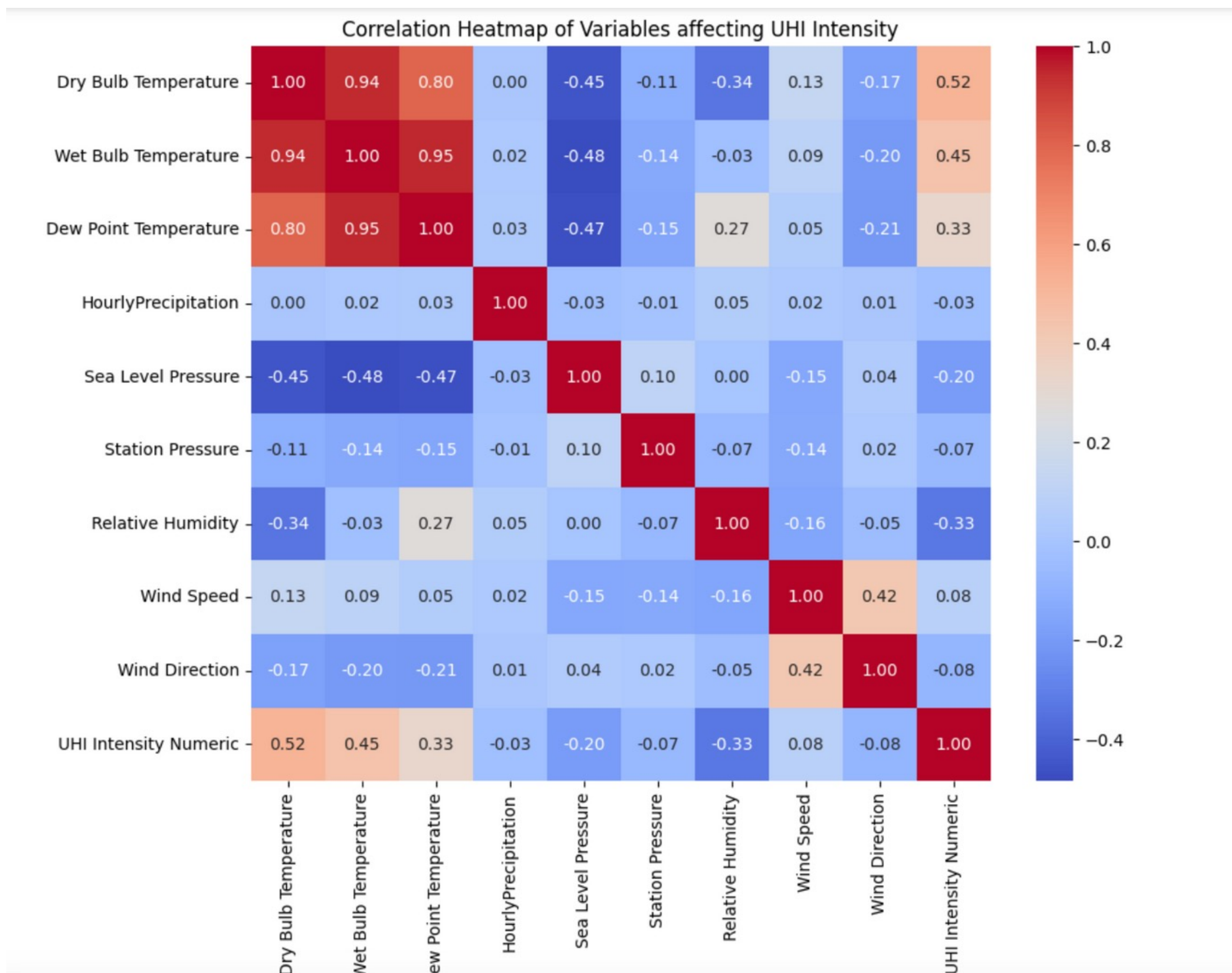
- **Data Standardization**

The goal was to normalize the data, ensuring that all numerical values were brought to a common scale.



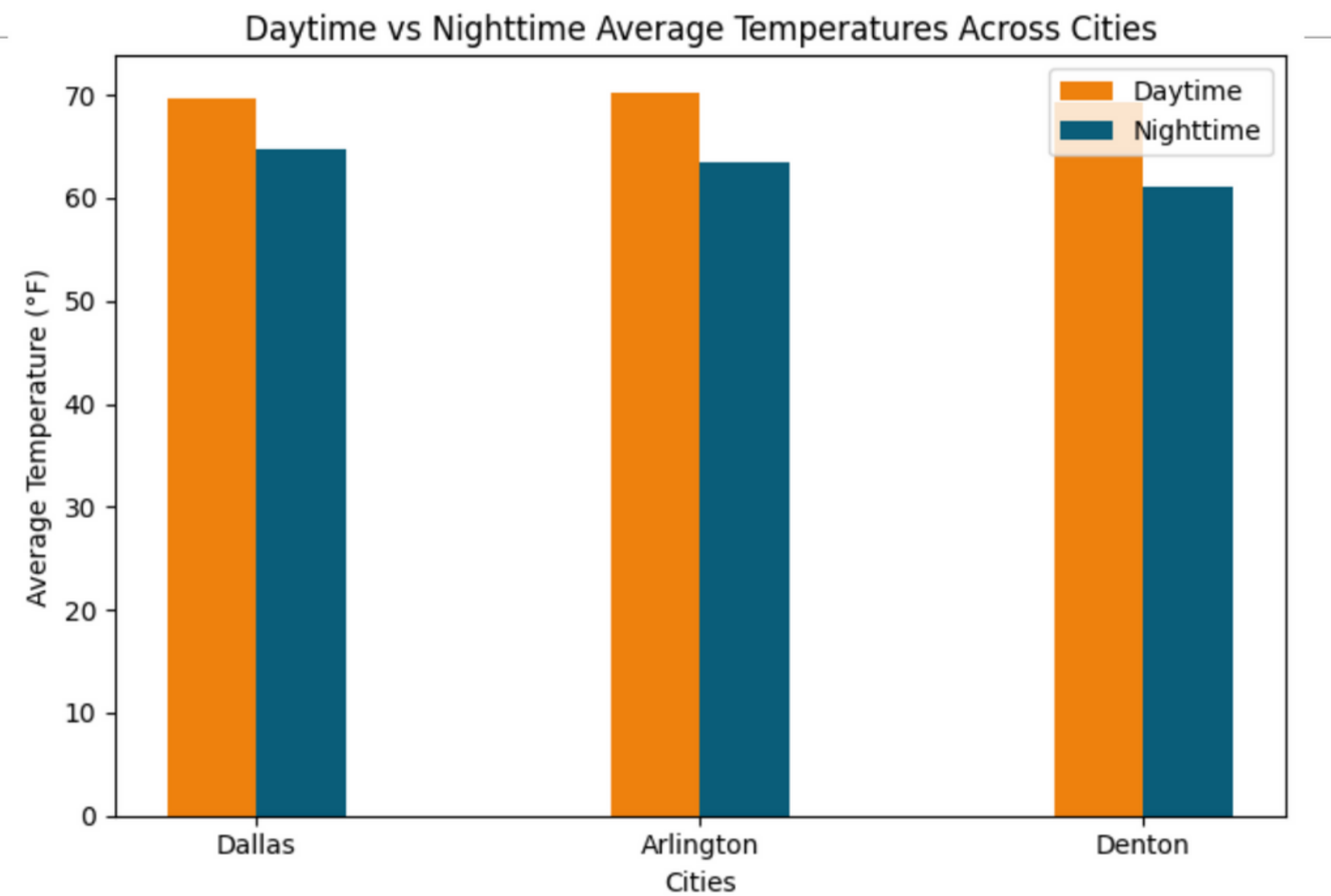
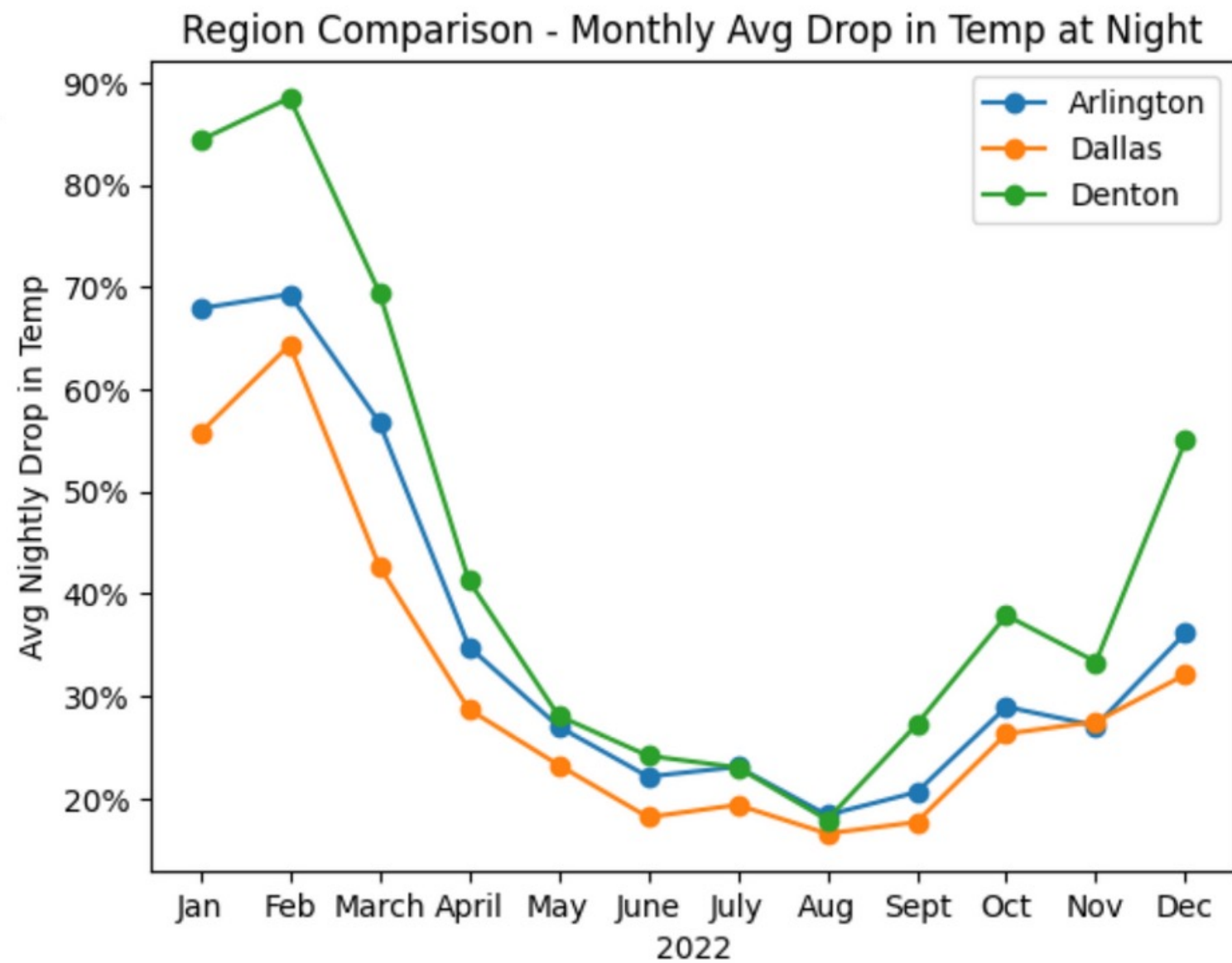
# Exploratory Data Analysis

- Summary Statistics
- Box plots
- Temperature plots
- Histograms and Distributions
- Correlation Analysis
- Temporal Comparison



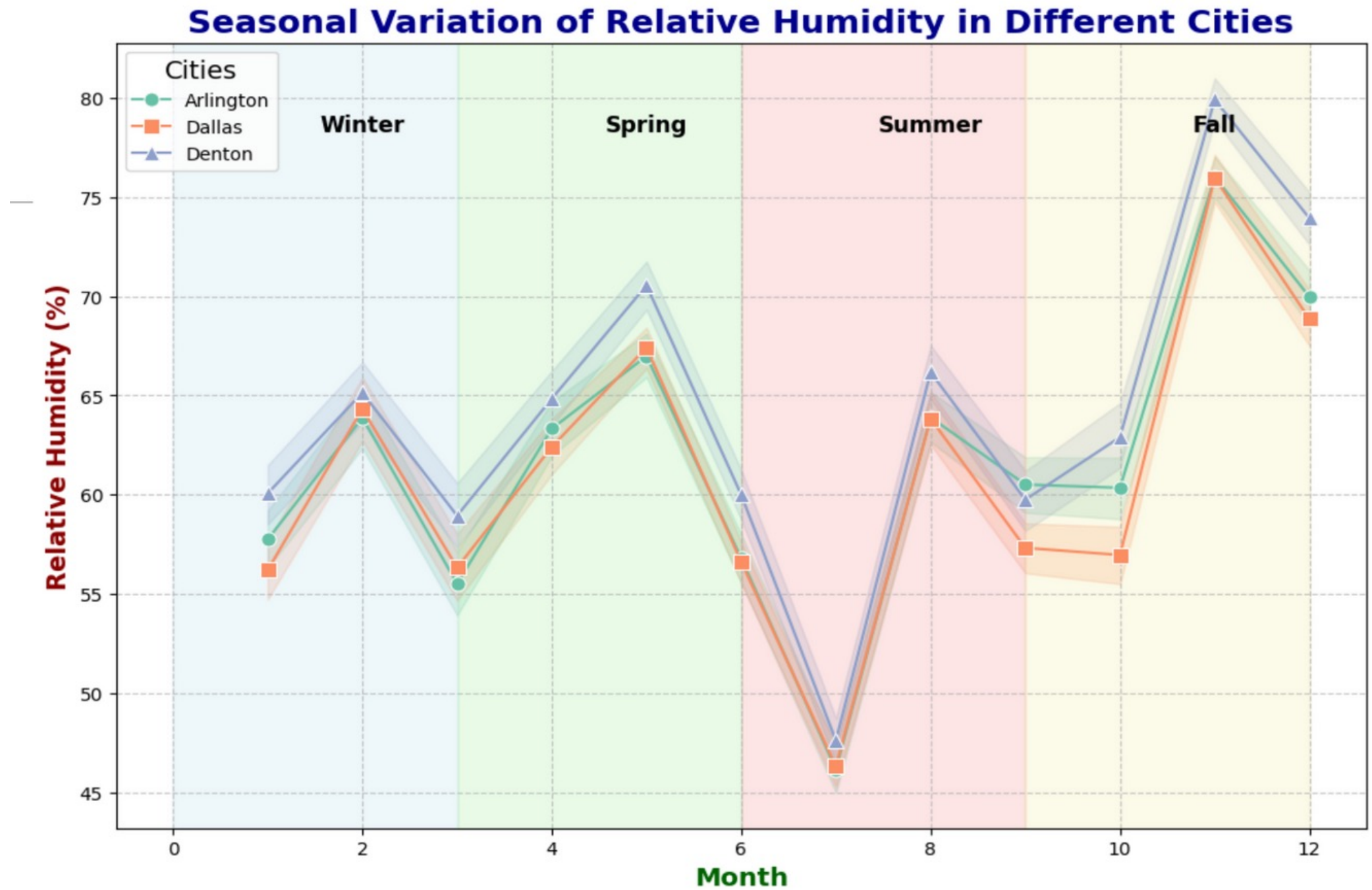
# Correlation Analysis

# Temperature differences: Monthly and Daily





# Seasonal Variation in Humidity



# Feature Engineering

## 1.Dallas (Significant City):

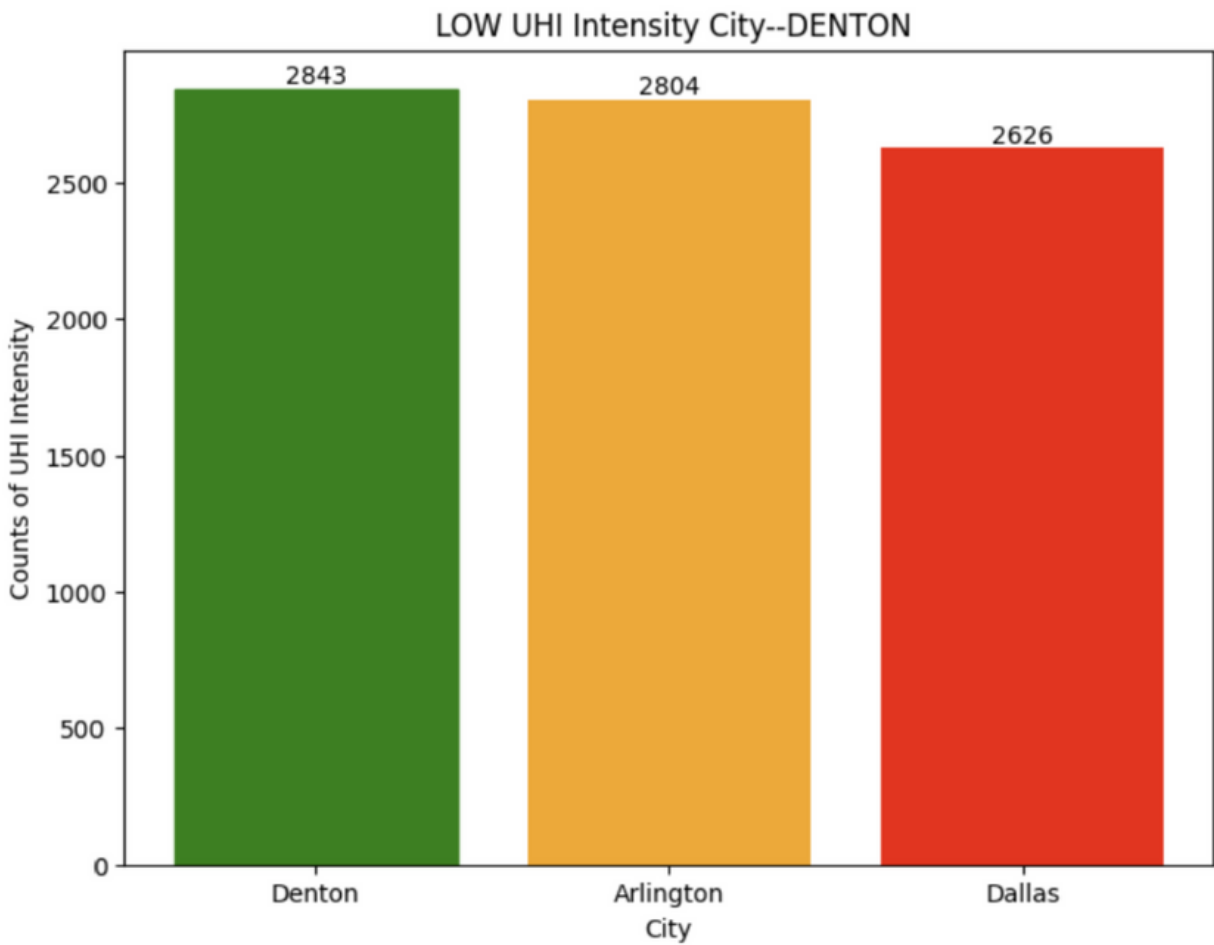
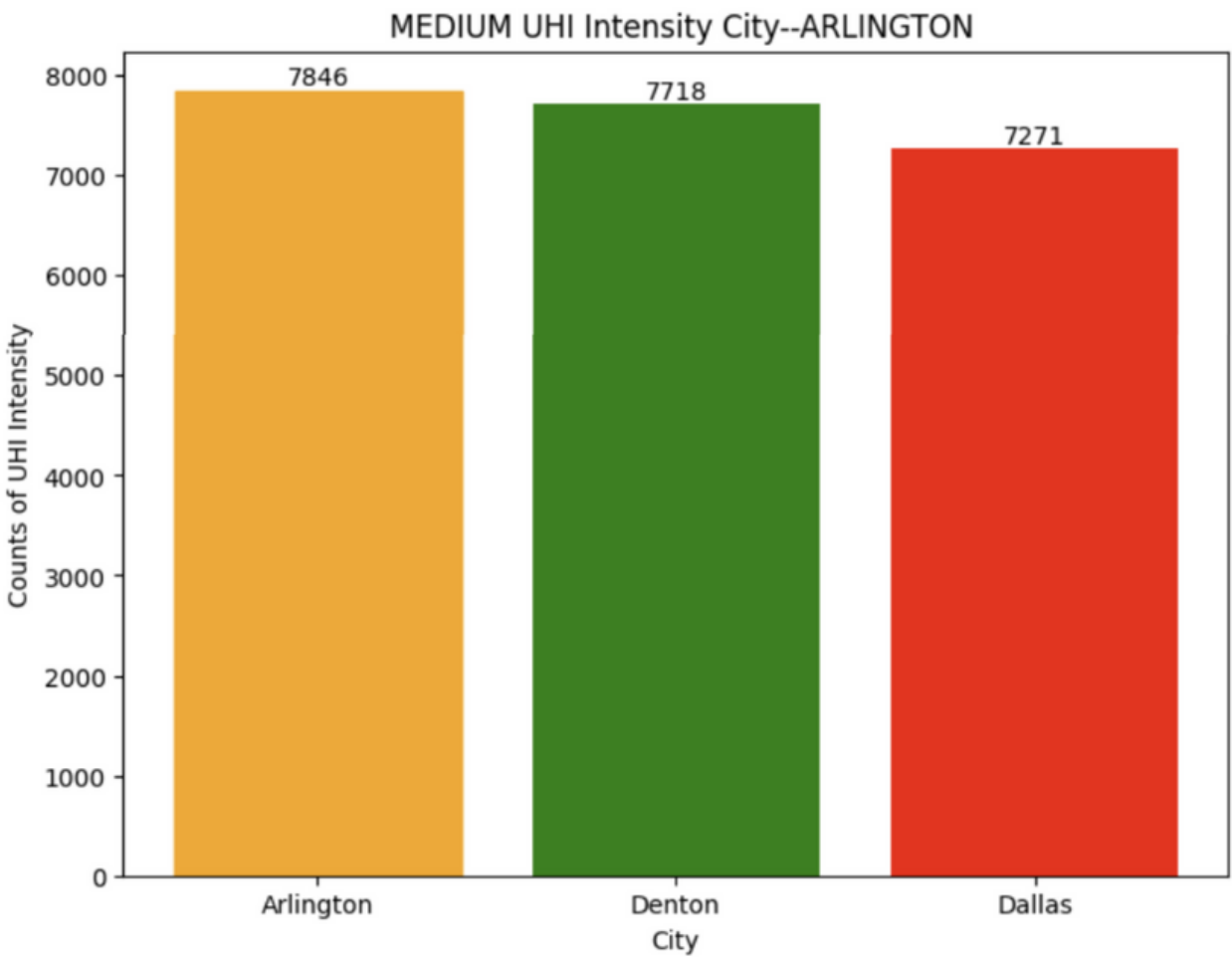
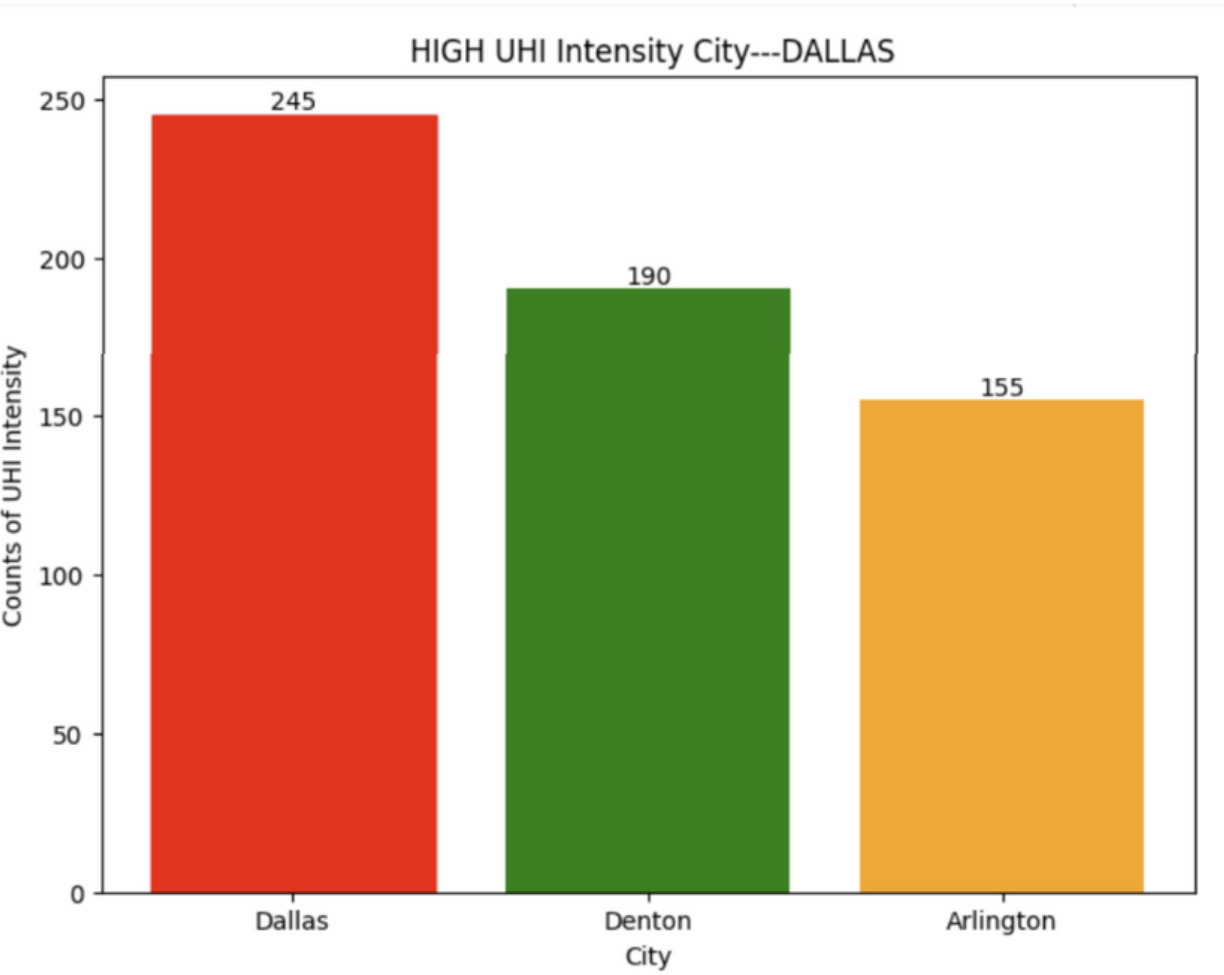
Analyzing UHI in a major metropolitan area with large population density.

## 2. Arlington (Suburban Town):

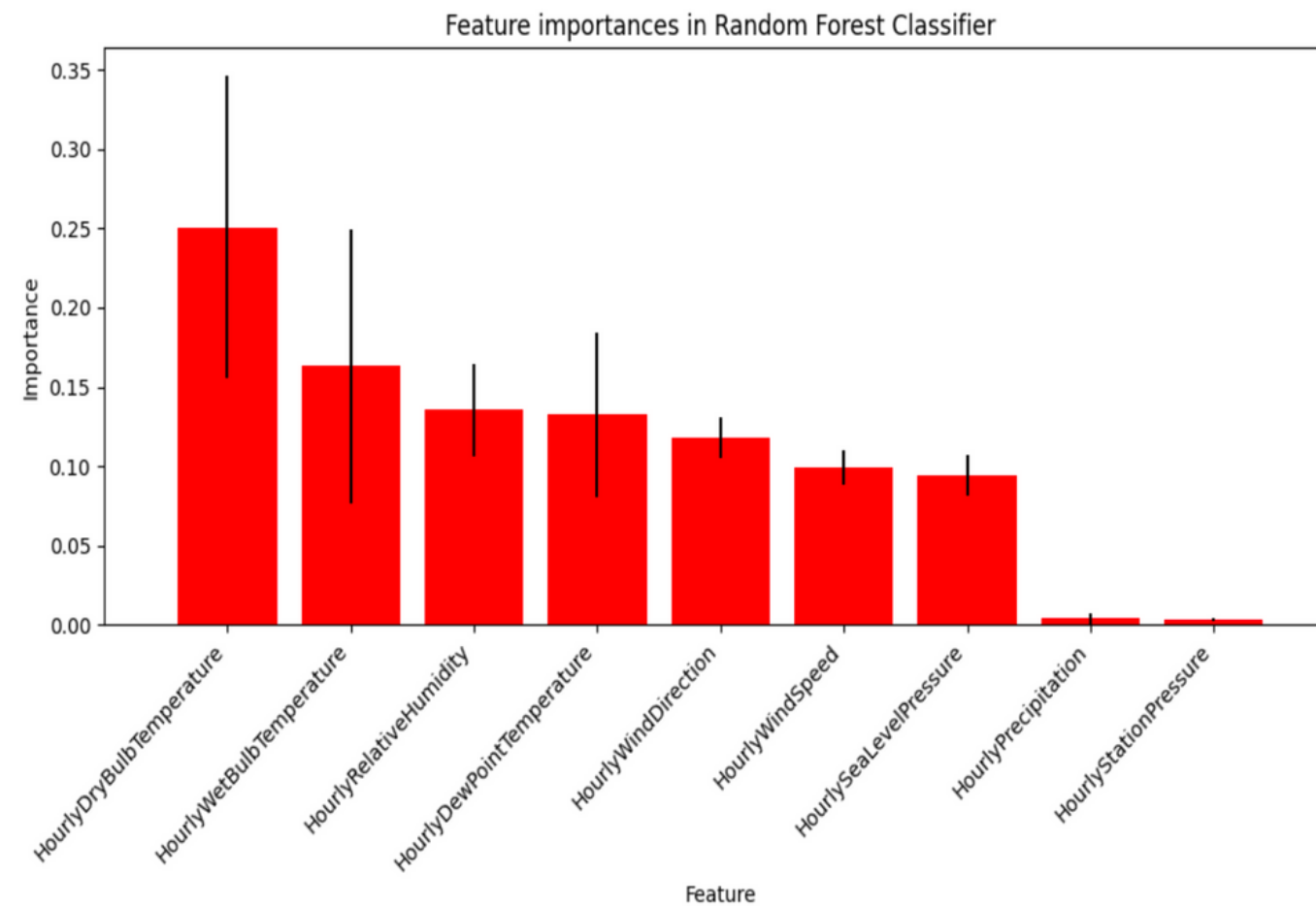
Evaluating UHI in a suburban setting with moderate population density.

## 3. Denton (Rural City):

Examining UHI in a rural city with lower population density.



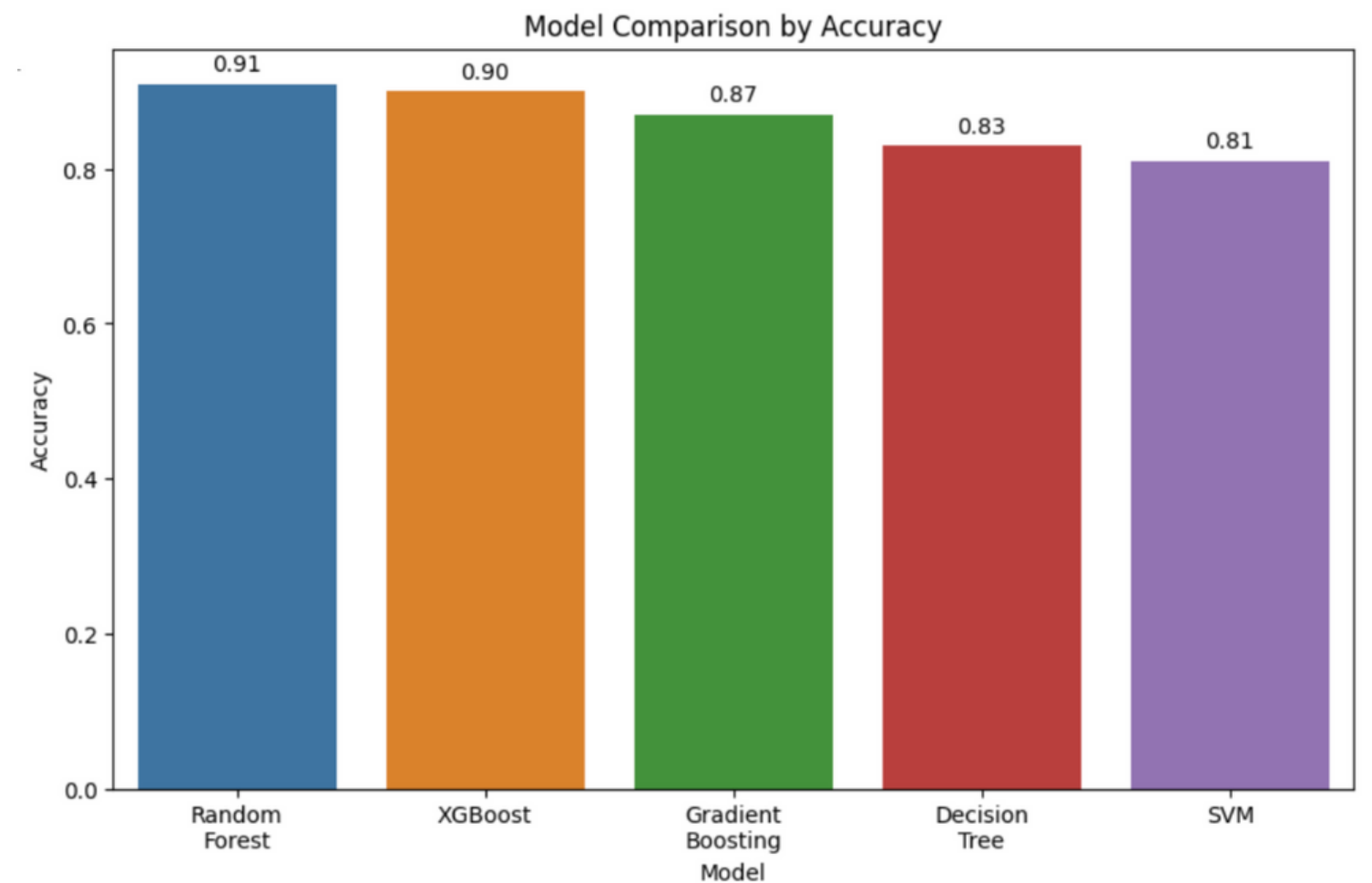
# Model Development



## Feature Importance using Random Forest Classifier

### Model selection:

- Random Forest
- XGBoost
- Gradient Boost
- Decision Tree
- Support Vector Machine







**Thankyou!**