*BTECH FINAL PROJECT   
  
State Agricultural Department*  
**Climate Impact Analysis on Rainfed Agriculture** | Location | Dates of Internship

**Project Overview:** Developed a comprehensive analysis framework to evaluate the impacts of climate change on rainfed agriculture in India, focusing on crop yield predictions under future climate scenarios and providing actionable insights for agricultural adaptation strategies.

**Responsibilities:**

* **Data Collection & Management:**
  + Extracted and aggregated historical agricultural data using SQL from department databases, focusing on key variables such as crop yield, area cultivated, rainfall, and temperature.
  + Cleaned and preprocessed large datasets in R, including handling missing values and normalizing data to ensure accuracy in analysis.
* **Data Analysis & Predictive Modeling:**
  + Conducted exploratory data analysis (EDA) to identify trends and anomalies using statistical techniques in R.
  + Built predictive models using Boosted Regression Trees to forecast the impacts of varying climatic conditions on crop yields, achieving a model accuracy conducive to reliable predictions.
* **Visualization & Reporting:**
  + Created dynamic, interactive visualizations and dashboards in Tableau to represent complex data findings clearly and effectively, enabling stakeholders to explore trends and predictions.
  + Synthesized findings into a comprehensive report detailing predictive insights and proposed adaptation strategies, which was presented to department heads and policy makers.

**Tools & Technologies:**

* **SQL:** Data extraction and initial data handling.
* **R:** Data cleaning, statistical analysis, regression analysis, and machine learning modeling.
* **Tableau:** Advanced data visualization and interactive dashboard creation.

**Key Achievements:**

* Enhanced decision-making processes within the Agricultural Department by providing a detailed climate impact assessment, which informed the development of new policies and practices.
* Contributed to the department's long-term strategy for climate resilience by identifying vulnerable regions and recommending specific agricultural adaptations.
* Received commendation from the department head for exceptional analytical work and insightful reporting that significantly contributed to the strategic planning efforts.

This resume entry effectively communicates your role, skills, and contributions while demonstrating your ability to handle complex data and provide actionable insights in a professional context.

Objective

The goal of this project is to analyze the effects of climate change on rainfed crops, particularly focusing on areas at risk due to changes in climate variables like temperature and rainfall. The ultimate aim is to aid in decision-making for future agricultural planning and adaptation strategies.

Data Collection

Data was sourced from agricultural department records, which included historical data on crop yield, area cultivated, rainfall amounts, and temperature readings.

**SQL Code for Data Extraction:**

SELECT crop\_type, area\_cultivated, yield, rainfall, temperature

FROM agriculture\_data

WHERE region = 'Target Region' AND year BETWEEN 2000 AND 2022;

Data Preparation

Data was cleaned and preprocessed using R. This included handling missing values, normalizing data, and creating new variables.

**R Code for Data Preparation:**

library(dplyr)

data <- read.csv("agriculture\_data.csv")

clean\_data <- data %>%

filter(!is.na(yield)) %>%

mutate(rainfall\_index = rainfall / mean(rainfall, na.rm = TRUE),

temperature\_deviation = temperature - mean(temperature, na.rm = TRUE))

Data Analysis

Using R, we conducted both statistical analyses to understand trends and machine learning to predict future impacts.

**R Code for Regression Analysis:**

library(ggplot2)

model <- lm(yield ~ rainfall\_index + temperature\_deviation, data = clean\_data)

summary(model)

Predictive Modeling

We utilized boosted regression trees to predict crop yields under future climate scenarios, adjusting for projected changes in rainfall and temperature

**R Code for Boosted Regression Trees:**

library(gbm)

set.seed(123)

gbm\_model <- gbm(yield ~ rainfall\_index + temperature\_deviation,

data = clean\_data, distribution = "gaussian", n.trees = 5000,

interaction.depth = 4, shrinkage = 0.01, cv.folds = 5)

summary(gbm\_model)

Data Visualization

We used Tableau for dynamic and interactive visualizations that allow stakeholders to explore data through various filters like region, crop type, and time periods.

**Tableau Dashboard Setup:**

1. Connect Tableau to the cleaned dataset.
2. Create a dashboard that includes:
   * A map visualization to show crop yield changes geographically.
   * Time-series graphs for rainfall and temperature deviations.
   * Scatter plots to correlate climate variables with crop yields.

Reporting and Decision Support

The final report was generated, compiling all analyses, predictive insights, and visualizations into a comprehensive document. Key findings were presented to stakeholders to help guide future agricultural policies and investment in infrastructure improvements.

Conclusion

The project successfully identified regions most at risk of declining yields due to climate change and provided actionable recommendations for adaptation strategies. By leveraging SQL for data extraction, R for data analysis, and Tableau for visualization, the project offers a robust approach to supporting sustainable agricultural practices in the face of climate variability.

This narrative gives a structured approach to tackling the problem using data analytics and visualization tools, suitable for academic or professional presentation.