

# **Weather classification & prediction**



F20DL UG Group 7

# Introduction



**A**

Rainfall  
classification



**B**

Sunshine amount  
prediction

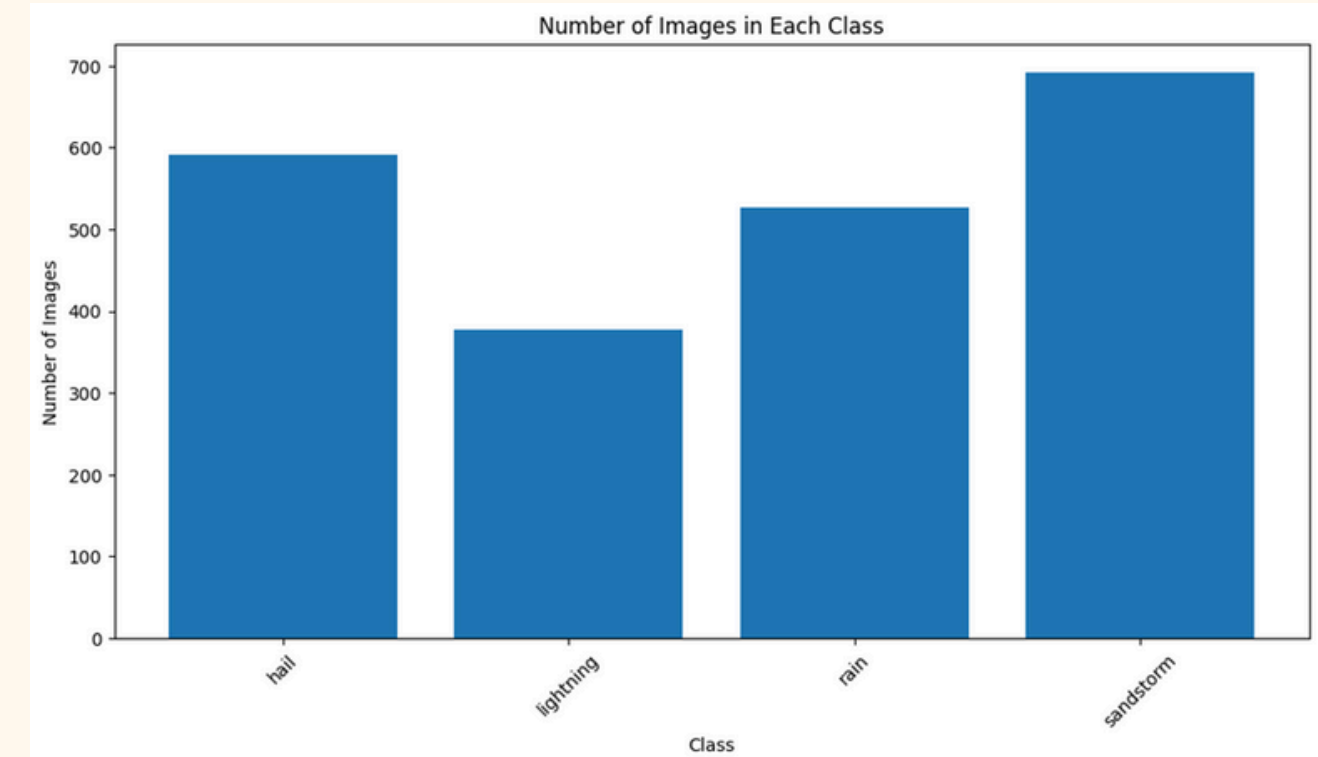
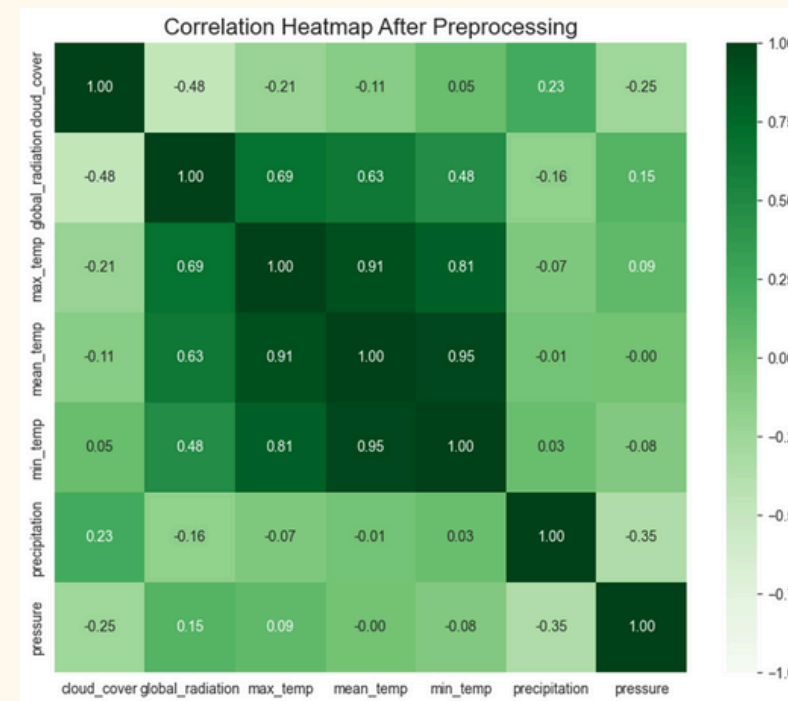
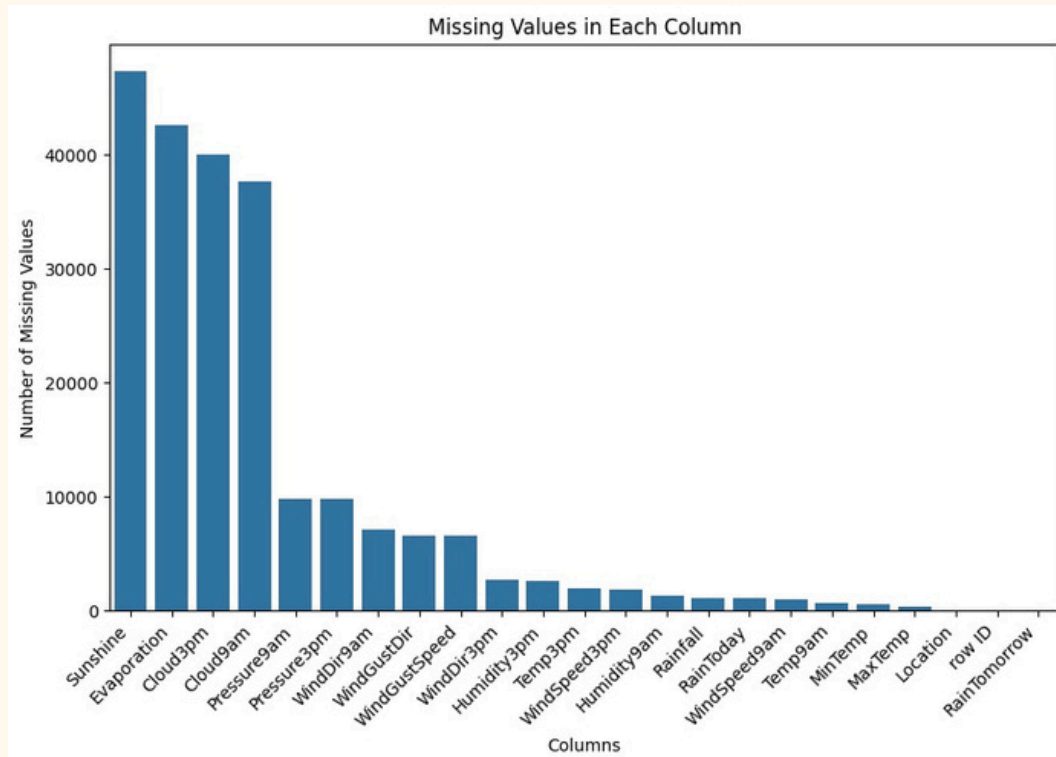


**C**

Weather image  
classification

# Analysis of chosen datasets

We chose 3 datasets. 2 tabular datasets and 1 image dataset.



**Australia Weather Data**

10 years, 22 attributes

PCA for feature reduction  
+  
Correlation Analysis

**London Weather Data**

42 years, 10 attributes

**Weather Image Recognition**

6,862 images, 11 classes

Handled missing values  
and class imbalances.

Oversampling + Undersampling

**PREPROCESSED**

# MODELS EXPLORED

## Regression

Explored models such as:

- Linear
- Ridge
- Random Forest
- Neural Networks

## Classification

Explored models such as:

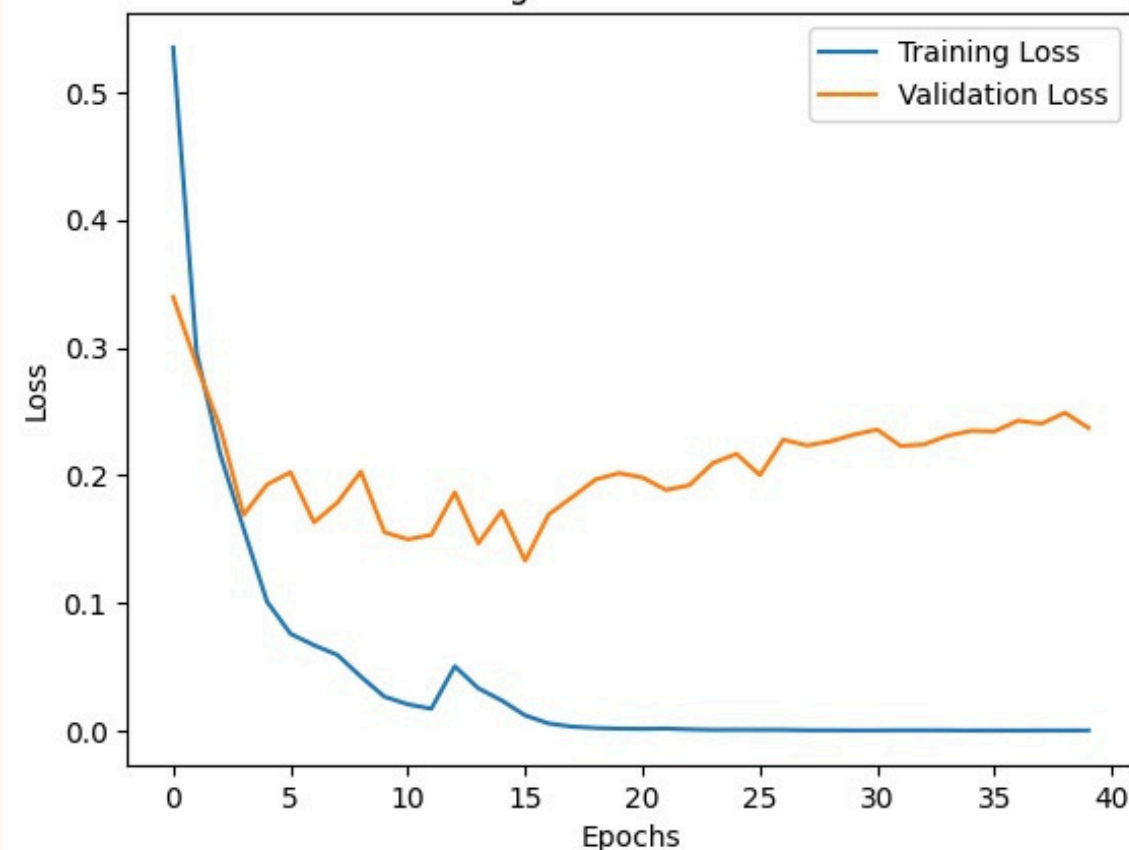
- Decision Trees
- kNN
- Naïve Bayes
- Various Neural Networks

## Clustering

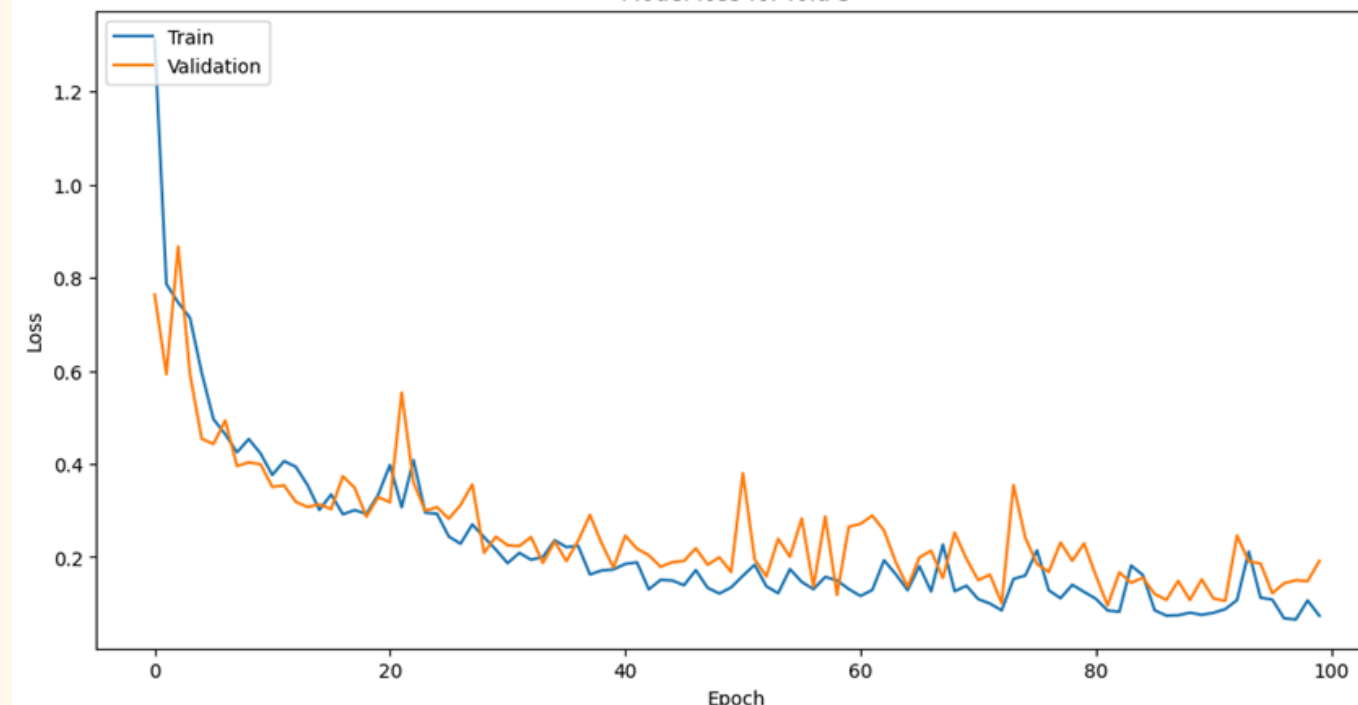
Explored models such as:

- K-Means
- Gaussian Mixture Models

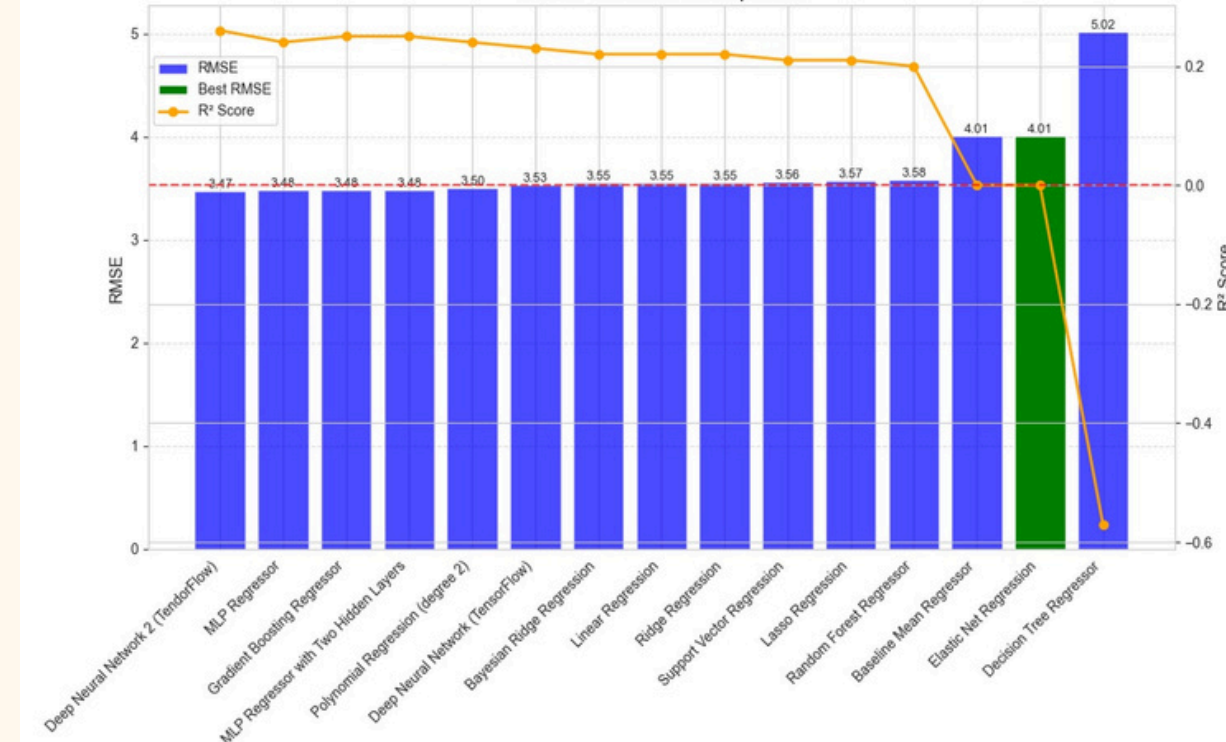
Training and Validation Loss



Model loss for fold 3



Model Performance Comparison





# RESULTS!



DATASET	BEST NEURAL NETWORK	BEST NON-NEURAL NETWORK MODEL	BEST OVERALL MODEL
	Adjusted Neural Network: Accuracy: 95.67%.	CatBoost: Accuracy: 92.67%	Adjusted Neural Network
	Deep Neural Network: RMSE: 3.47, $R^2$ : 0.26	XGBoost: RMSE: 3.48, $R^2$ : 0.25	Deep Neural Network
	Five and Three Layer CNN: Accuracy: 94.09%	XGBoost (with PCA): Accuracy: 80.46%	Five-Layer CNN - 1

In order to verify our results we carried out 5 fold cross-validation.





# Conclusions



1

Preprocessing, feature engineering, and experimentation were crucial.

2

Neural Networks excel at handling complex patterns.

3

Ensemble methods like CatBoost and XGBoost provided competitive alternatives.

**Advanced ML techniques significantly improve weather-related predictions and classification tasks.**

