NASA Space Mission AI Project

Track: Implementation Track

Project Description: Build an AI to predict radiation exposure levels for astronauts based on numerical data from space weather (e.g., solar activity, cosmic ray flux).

Dataset: Use NASA's space weather datasets.

Models:

1. Use Neural Network
2. Use regression models (e.g., Linear Regression, XGBoost) to predict radiation levels from input variables like solar flare intensity.

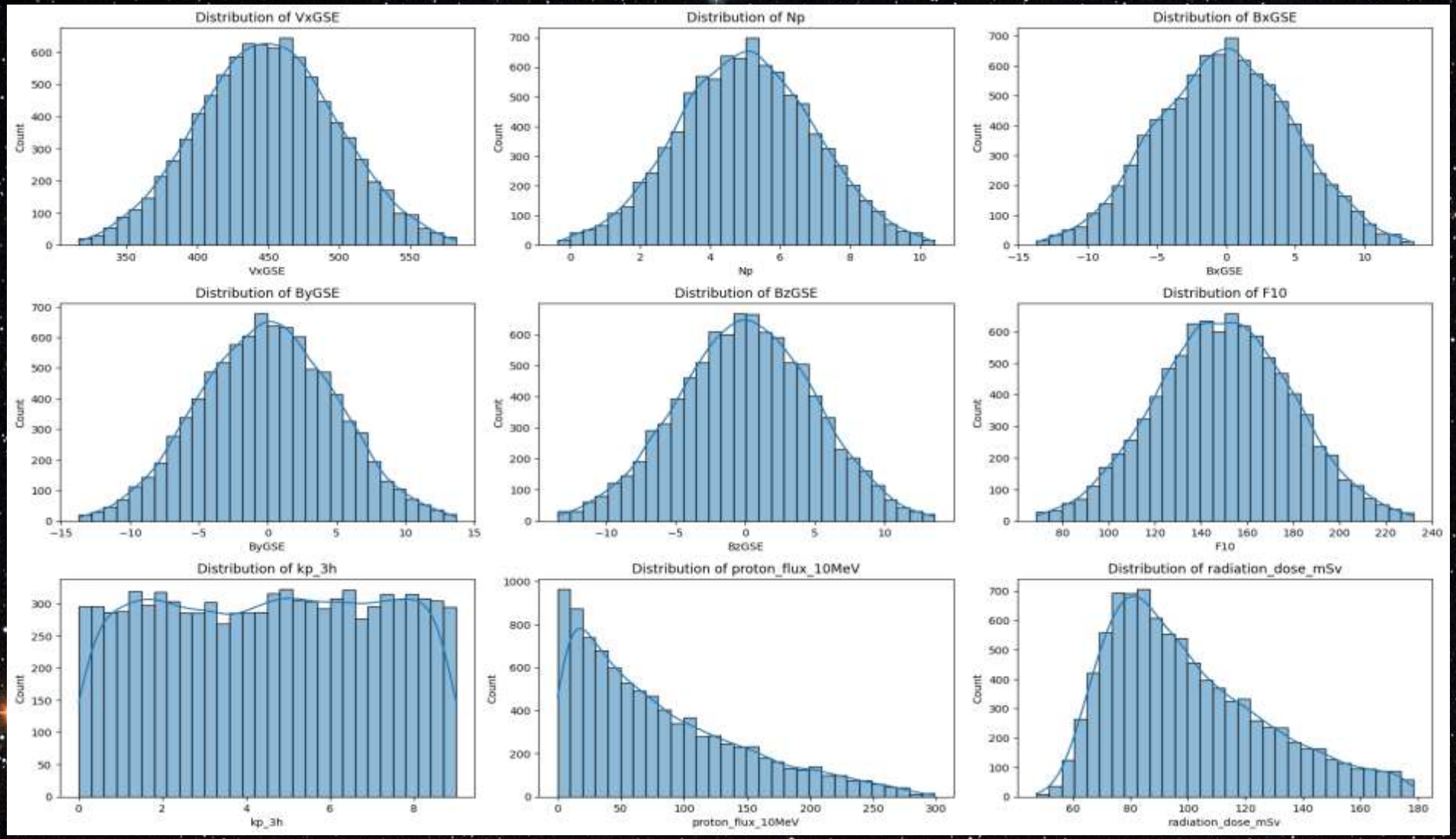
Features (inputs):

- **Solar wind speed (VxGSE)** — speed of charged particles flowing from the Sun
- **Proton density (Np)** — concentration of solar protons in the solar wind
- **IMF components (BxGSE, ByGSE, BzGSE)** — interplanetary magnetic field vector components
- **Solar radio flux (F10)** — 10.7 cm solar radio emission, a proxy for solar activity
- **Geomagnetic index (kp_3h)** — geomagnetic disturbances over 3-hour intervals
- **Proton flux (proton_flux_10MeV)** — high-energy solar protons measured by GOES satellites

Target (output):

- **Radiation dose (radiation_dose_mSv)** — a synthetic value representing astronaut radiation exposure in millisieverts, generated as a weighted sum of input features plus noise

Data Distributions



Neural Network

ReLu Activation

Loss Function: Adam Optimizer

Sequential Model

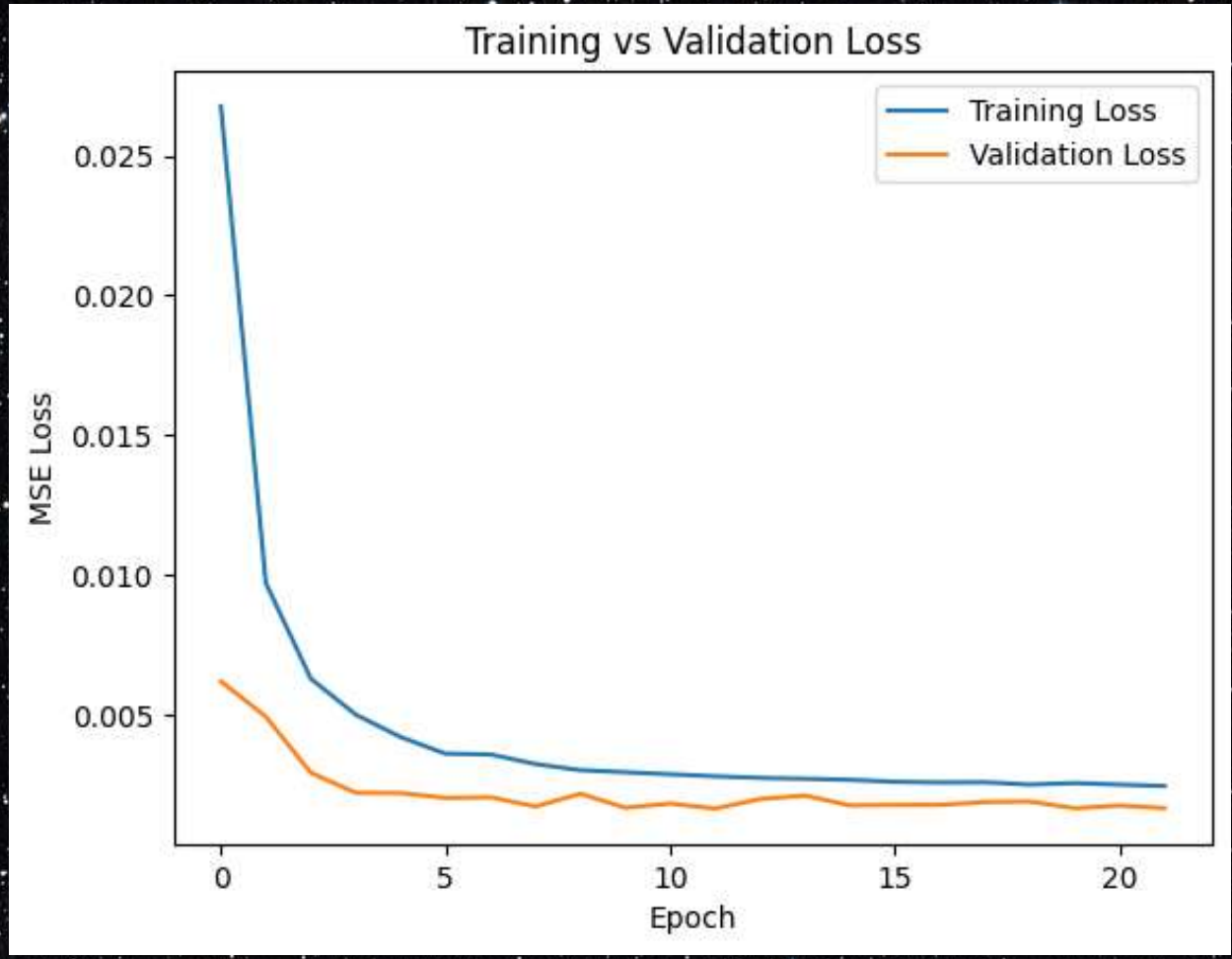
2 Layers

Evaluation

MSE: 0.00

R^2: 0.9623

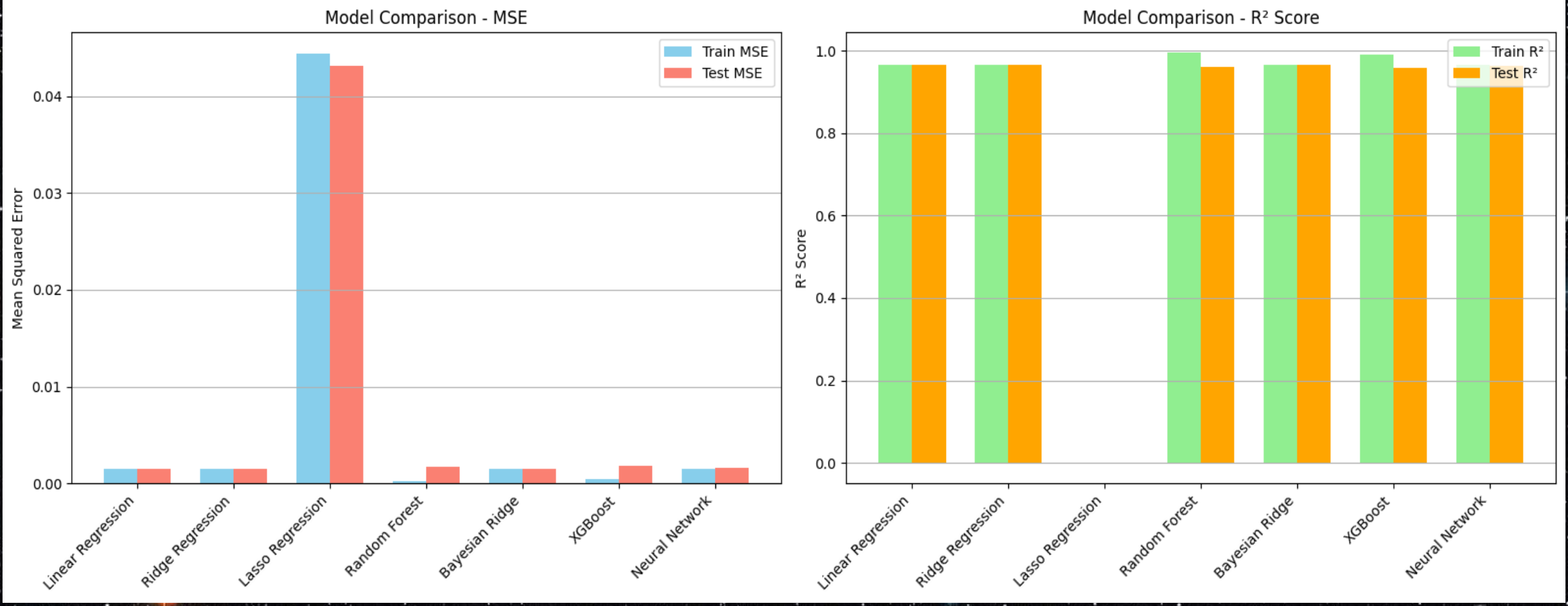
Training VS Loss Validaton



Regression Models

Linear Regression:
MSE = 0.00, R2 = 0.9649
Ridge Regression:
MSE = 0.00, R2 = 0.9650
Lasso Regression:
MSE = 0.04, R2 = -0.0000
Random Forest:
MSE = 0.00, R2 = 0.9616
Bayesian Ridge: MSE = 0.00, R2 = 0.9649
XGBoost:
MSE = 0.00, R2 = 0.9592

Comparisons




Thank You