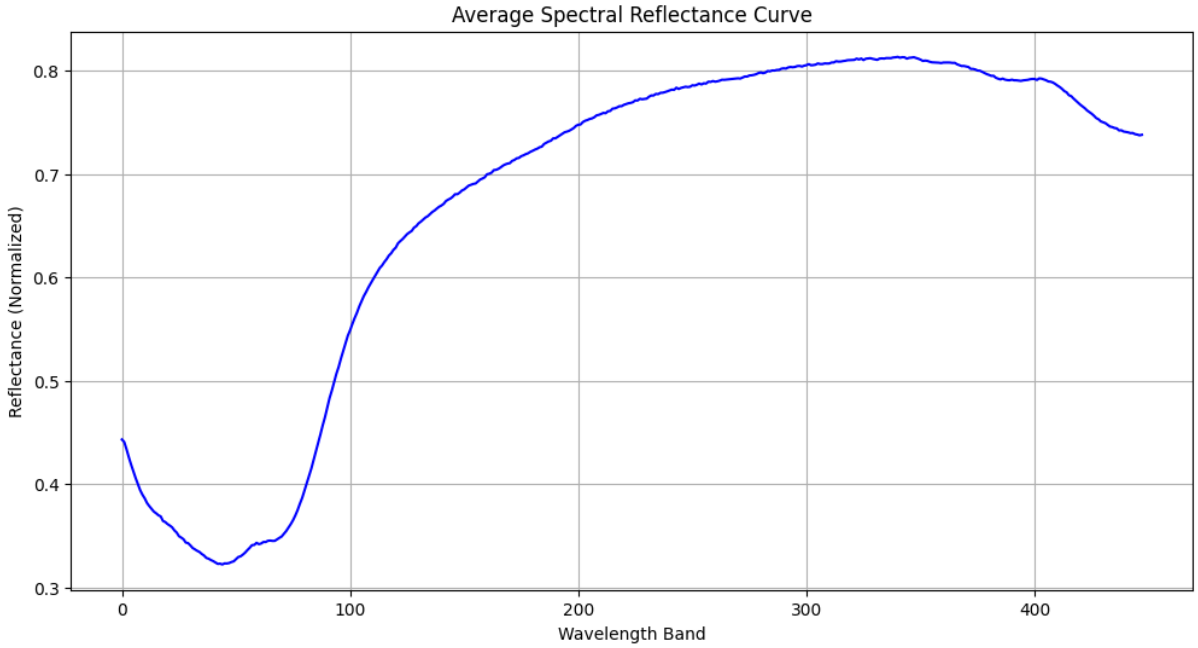
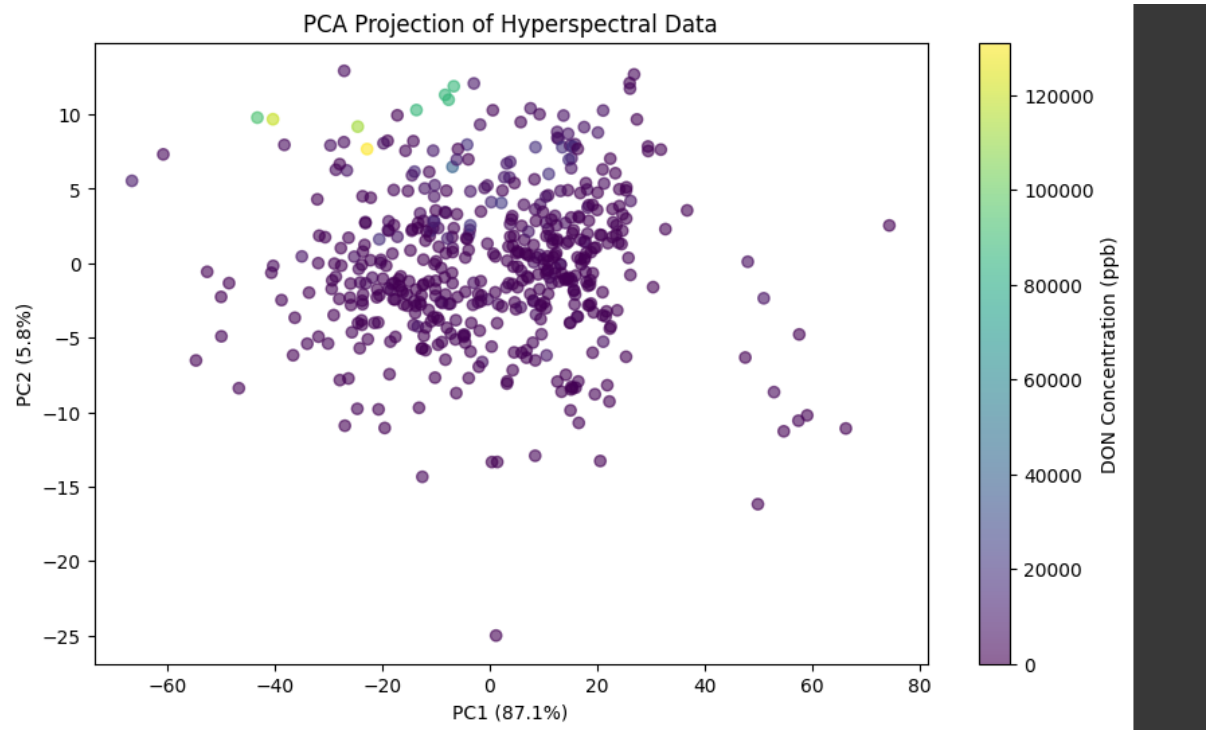
Task for ML Intern

RESULTS :

```
# Basic data check
print(f"Dataset shape: {df.shape}")
print(f"Missing values: {X.isnull().sum().sum()}")
```

```
Dataset shape: (500, 450)
Missing values: 0
```






```
Reduced from 448 to 3 components
```

```python
# Train model
model = build_model(X_train.shape[1])
history = model.fit(
    X_train, y_train,
    epochs=150,
    batch_size=32,
    validation_split=0.2,
    verbose=1
)
```

```
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 13ms/step - loss: 49581684.0000 - mae: 2275.5200 - val_loss: 49861192.0000 - val_mae: 2777.2283
Epoch 123/150
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step - loss: 70403504.0000 - mae: 2461.6880 - val_loss: 50143632.0000 - val_mae: 2895.4565
Epoch 124/150
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step - loss: 79587792.0000 - mae: 2710.5820 - val_loss: 50213120.0000 - val_mae: 2928.6992
Epoch 125/150
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 12ms/step - loss: 109345592.0000 - mae: 2845.7354 - val_loss: 50168752.0000 - val_mae: 2946.2151
Epoch 126/150
10/10 ━━━━━━━━━━━━━━━━━━━━ 0s 11ms/step - loss: 91850072.0000 - mae: 2777.4749 - val_loss: 49122732.0000 - val_mae: 2835.2251
Epoch 127/150
```

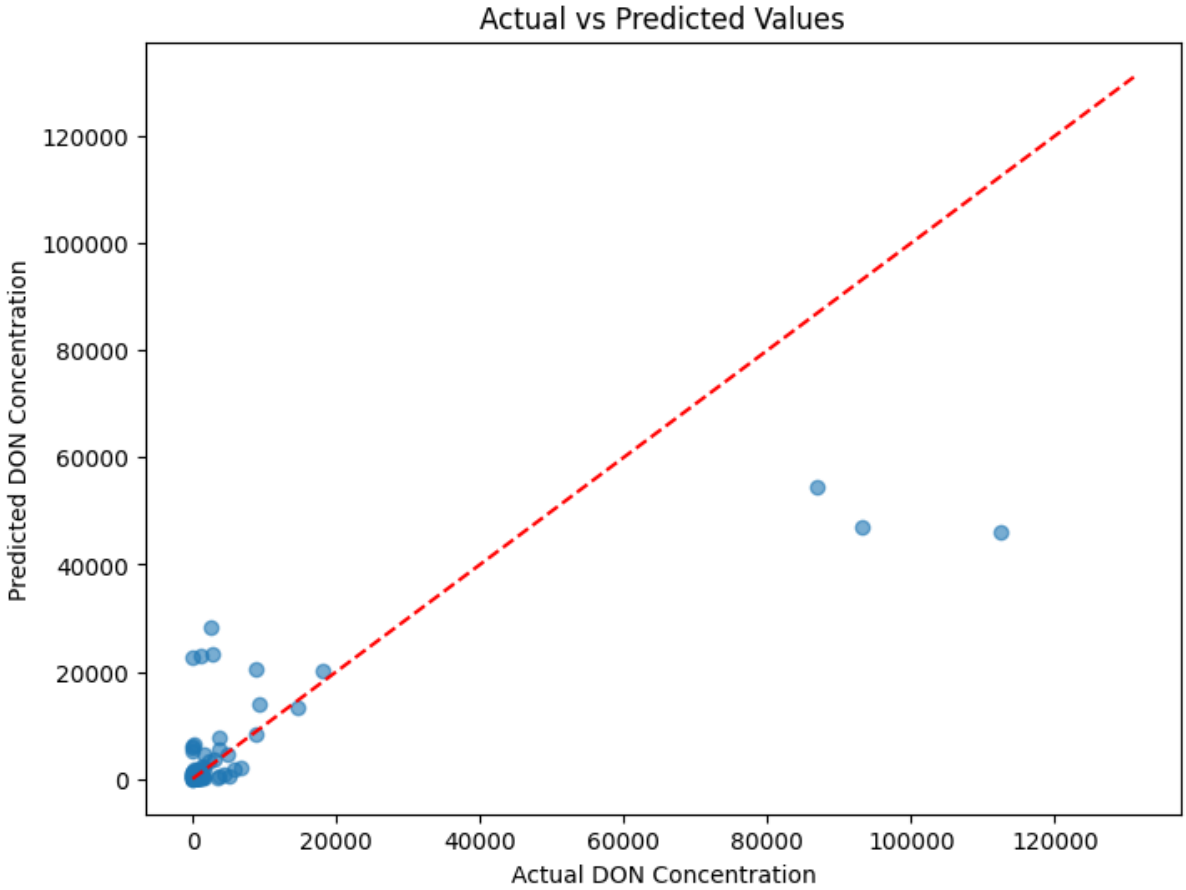
```python
# Step 8: Model Evaluation
y_pred = model.predict(X_test).flatten()

metrics = {
    'MAE': mean_absolute_error(y_test, y_pred),
    'RMSE': np.sqrt(mean_squared_error(y_test, y_pred)),
    'R²': r2_score(y_test, y_pred)
}

print("\nModel Performance:")
for k, v in metrics.items():
    print(f"{k}: {v:.4f}")
```

```
4/4 ━━━━━━━━━━━━━━━━━━━━ 0s 22ms/step

Model Performance:
MAE: 3451.2347
RMSE: 10049.1264
R²: 0.6387
```



```
XGBoost Performance:
MAE: 3457.1224
RMSE: 10523.5587
R²: 0.6038
```