Design and Development of Embedded System
COE188P/E01

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Test Results: Farm Monitoring System

Results

Model 1.18: Trained

Training Results

RMSE (Validation)	0.45323
R-Squared (Validation)	0.98
MSE (Validation)	0.20541
MAE (Validation)	0.10845
Prediction speed	~4600 obs/sec
Training time	620.72 sec

Test Results

RMSE (Test)	0.42329
R-Squared (Test)	0.99
MSE (Test)	0.17917
MAE (Test)	0.10564

Model Type
Preset: Exponential GPR
Basis function: Constant
Kernel function: Exponential
Use isotropic kernel: true
Kernel scale: Automatic
Signal standard deviation: Automatic
Sigma: Automatic
Standardize: true
Optimize numeric parameters: true

Optimizer Options
Hyperparameter options disabled

Feature Selection
All features used in the model, before PCA

PCA
PCA disabled

Figure. 7.1 Test Results of the Predictive Model

The data that the researchers acquired in the ThingSpeak server are divided into two sets: training data and testing data. The details regarding the test results statistics and the deployed model are shown in the figure. The researchers can assess that based on the parameters shown, it can be used as a model for the system. The test results consist of statistical values like RMSE, R-Squared, MSE and MAE. The testing results showed an RMSE value of 0.42 meaning the difference between actual and predicted values are minimal. Also

the RMSE value is closer to zero and the R-Squared value is close to 1 which means that the model is accurate.

Another evidence is shown in the validation plot of predicted vs actual response. As shown in the plot, many responses from the predictive model are scattered near the perfect prediction line which is a good thing.

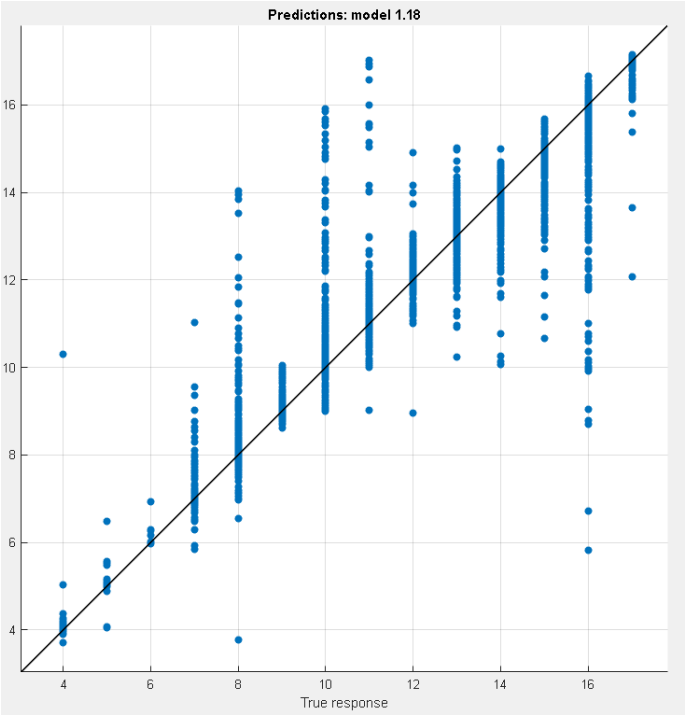

Figure. 7.2 Validation Plot of Predicted vs. Actual Response

Although the application was created using MATLAB App Designer, the estimated date before the seedlings can be transferred is correct because the duration predicted by the model is around 16.9842 days while the true value is 17 days. However, the estimated day left as shown in the figure is 0 days since the predicted date is subtracted to 15 since it is the estimated date for the seedlings transfer. If the difference between the predicted day and the true estimated day is negative, the application will show a value of zero and the control lamp will light up below.

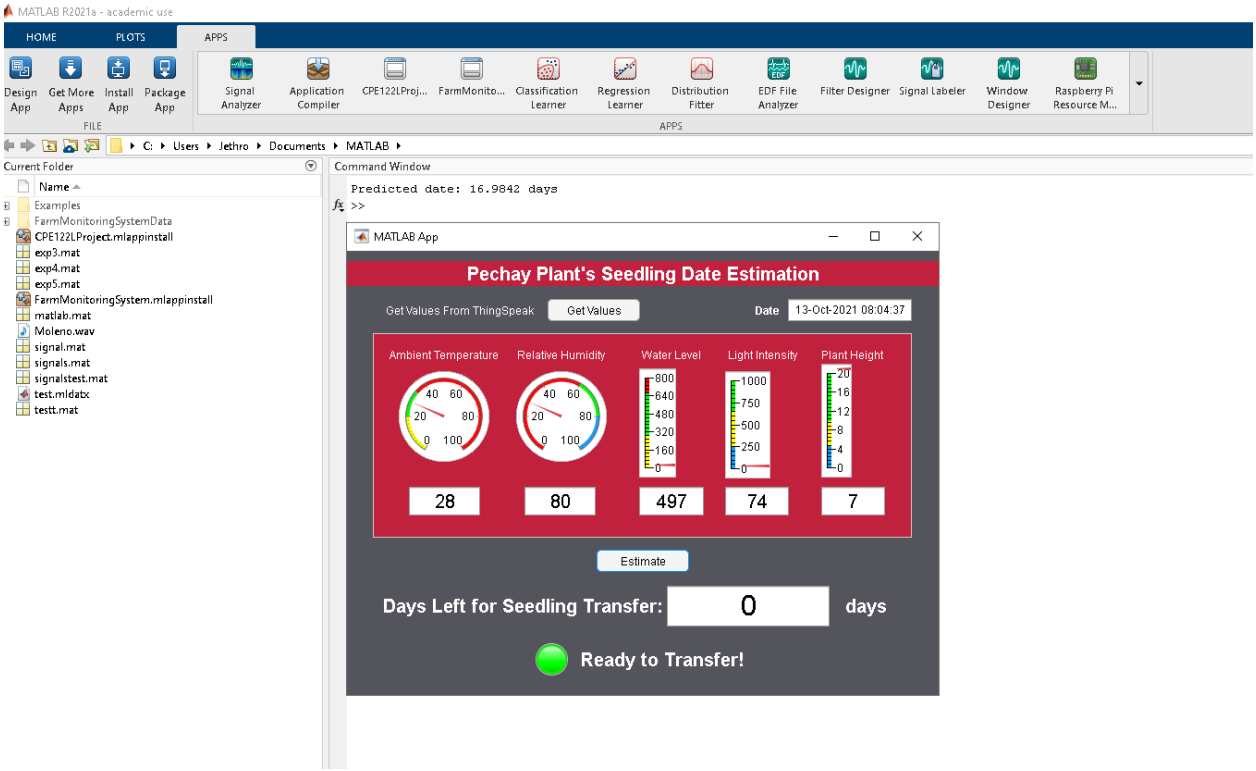

Figure. 7.3 Screenshot of Application estimating the number of days left before seedling transfer