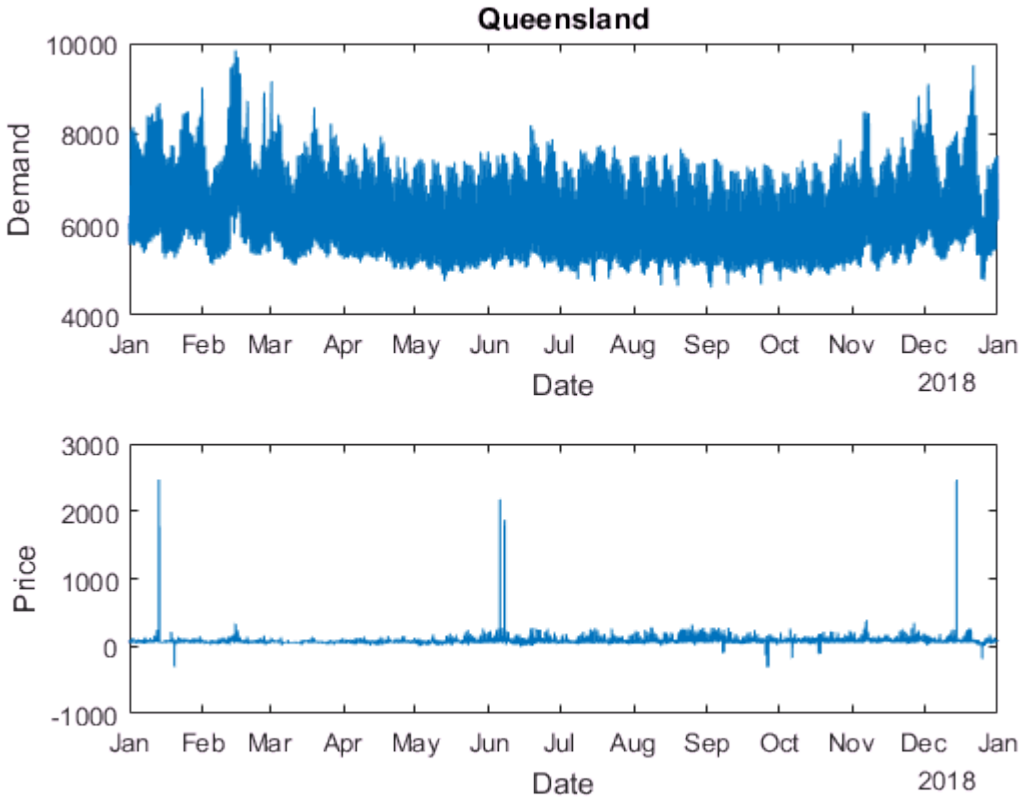
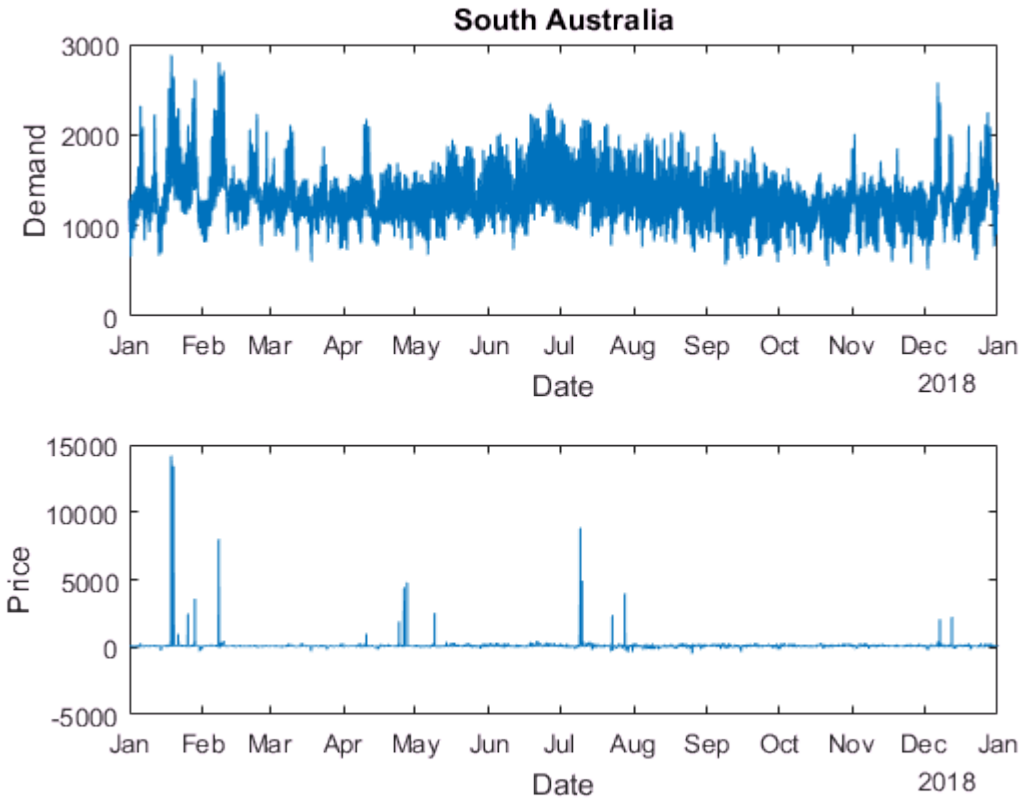
```
% Initial values
rng default;
```

```
% Load in Data
[qDate,qDemand,qPrice] = GetQueenslandData();

[saDate,saDemand,saPrice] = GetSouthAustraliaData();

[qPreviousDate,qPreviousDemand,qPreviousPrice] = OldQueenslandData();

[saPreviousDate,saPreviousDemand,saPreviousPrice] = OldSouthAustraliaData();
```

```
% Plot Data
PlotData(qDate,qDemand,qPrice,'Queensland');
```




```
PlotData(saDate,saDemand,saPrice,'South Australia');
```




```
% Get Date arrays for models
dateArray = [qDate.Month,qDate.Day,qDate.Hour,qDate.Minute];

dateArrayPrevious = [qPreviousDate.Month,qPreviousDate.Day,qPreviousDate.Hour,qPreviousDate.Mi
```

```
% Get Summer and Winter indexes
startSummerIndex = FindIndex('01-Dec-2018 00:00:00', qDate);
endSummerIndex = FindIndex('28-Feb-2018 23:30:00', qDate);

startWinterIndex = FindIndex('01-Jun-2018 00:00:00', qDate);
endWinterIndex = FindIndex('31-Aug-2018 23:30:00', qDate);
```

```
% Get Mean values for Queensland and South Australia Data in 2018

GetMeanSummer(qDemand, startSummerIndex, endSummerIndex, 'Queensland', 'Demand');
```

```
Queensland Mean Demand in Summer: 6670
```

```
GetMeanSummer(qPrice, startSummerIndex, endSummerIndex, 'Queensland', 'Price');
```

```
Queensland Mean Price in Summer: 76
```

```

GetMeanWinter(qDemand, startWinterIndex, endWinterIndex, 'Queensland', 'Demand');
```

```
Queensland Mean Demand in Winter: 6054
```

```
GetMeanWinter(qPrice, startWinterIndex, endWinterIndex, 'Queensland', 'Price');
```

```
Queensland Mean Price in Winter: 77
```

```
GetMeanSummer(saDemand, startSummerIndex, endSummerIndex, 'South Australia', 'Demand');
```

```
South Australia Mean Demand in Summer: 1370
```

```
GetMeanSummer(saPrice, startSummerIndex, endSummerIndex, 'South Australia', 'Price');
```

```
South Australia Mean Price in Summer: 120
```

```
GetMeanWinter(saDemand, startWinterIndex, endWinterIndex, 'South Australia', 'Demand');
```

```
South Australia Mean Demand in Winter: 1391
```

```
GetMeanWinter(saPrice, startWinterIndex, endWinterIndex, 'South Australia', 'Price');
```

```
South Australia Mean Price in Winter: 95
```

```
% Create models and test the training error
modelQLDDemand = fitlm(dateArray,qDemand);
modelQLDPrice = fitlm(dateArray,qPrice);

modelSADemand = fitlm(dateArray,saDemand);
modelSAPrice = fitlm(dateArray,saPrice);

CalculateError(qDemand, dateArray, modelQLDDemand, 'Queensland', 'Training', 'Demand');
```

```
Queensland Training error for Demand is: 511
```

```
CalculateError(qPrice, dateArray, modelQLDPrice, 'Queensland', 'Training', 'Price');
```

```
Queensland Training error for Price is: 18
```

```
CalculateError(saDemand, dateArray, modelSADemand, 'South Australia', 'Training', 'Demand');
```

```
South Australia Training error for Demand is: 217
```

```
CalculateError(saPrice, dateArray, modelSAPrice, 'South Australia', 'Training', 'Price');
```

```
South Australia Training error for Price is: 44
```

```
% Create models and test the testing error
[xTrain, xTest, yTrain, yTest] = CreateSplit( dateArray, qDemand, 0.5 );
model = fitlm(xTrain,yTrain);
CalculateError( yTest, xTest, model, 'Queensland', 'Testing', 'Demand' );
```

```
Queensland Testing error for Demand is: 512
```

```
[xTrain, xTest, yTrain, yTest] = CreateSplit( dateArray, qPrice, 0.5 );
model = fitlm(xTrain,yTrain);
CalculateError( yTest, xTest, model, 'Queensland', 'Testing', 'Price' );
```

```
Queensland Testing error for Price is: 19
```

```
[xTrain, xTest, yTrain, yTest] = CreateSplit( dateArray, saDemand, 0.5 );
model = fitlm(xTrain,yTrain);
CalculateError( yTest, xTest, model, 'South Australia', 'Testing', 'Demand' );
```

```
South Australia Testing error for Demand is: 217
```

```
[xTrain, xTest, yTrain, yTest] = CreateSplit( dateArray, saPrice, 0.5 );
model = fitlm(xTrain,yTrain);
CalculateError( yTest, xTest, model, 'South Australia', 'Testing', 'Price' );
```

```
South Australia Testing error for Price is: 45
```

```
% Test how well a model can predict a value under a threshold across various models in QLD
[xTrain, xTest, yTrain, yTest] = CreateSplit( dateArray, qPrice, 0.5 );
model = fitlm(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'linear');
```

```
linear Queensland TP: 3477 TN: 2283 FP: 911 FN: 2089
```

```
model = fitrgp(xTrain,yTrain, 'KernelFunction','ardsquaredexponential' );
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'Gaussian process regression');
```

```
Gaussian process regression Queensland TP: 4499 TN: 2392 FP: 801 FN: 1068
```

```
model = fitrsvm(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'SVM Linear');
```

```
SVM Linear Queensland TP: 4554 TN: 1637 FP: 1557 FN: 1012
```

```
model = fitrsvm(xTrain,yTrain, 'KernelFunction', 'gaussian');
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'SVM Gaussian');
```

```
SVM Gaussian Queensland TP: 5028 TN: 2312 FP: 881 FN: 539
```

```
model = fitrlinear(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'High deminsonal Linear Regression'
```

```
High deminsonal Linear Regression Queensland TP: 4513 TN: 1691 FP: 1503 FN: 1053
```

```
model = fitrtree(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'Tree Regression');
```

```
Tree Regression Queensland TP: 4807 TN: 2515 FP: 679 FN: 759
```

```
model = fitrensemble(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'Queensland', 'Ensemble of learners for regressio
```

```
Ensemble of learners for regression Queensland TP: 4687 TN: 2506 FP: 688 FN: 879
```

```
% Test how well a model can predict a value under a threshold across various models in South A

[xTrain, xTest, yTrain, yTest] = CreateSplit( dateArray, saPrice, 0.5 );
model = fitlm(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 90, model, 'South Australia', 'Generalized linear regressior
```

```
Generalized linear regression South Australia TP: 1704 TN: 2926 FP: 913 FN: 3217
```

```
model = fitrgp(xTrain,yTrain, 'KernelFunction','ardsquaredexponential' );
CalculateThreshold( xTest, yTest, 75, model, 'South Australia', 'Gaussian process regression')
```

```
Gaussian process regression South Australia TP: 1500 TN: 4765 FP: 832 FN: 1663
```

```
model = fitrsvm(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'South Australia', 'SVM Linear');
```

```
SVM Linear South Australia TP: 796 TN: 4941 FP: 656 FN: 2367
```

```
model = fitrsvm(xTrain,yTrain, 'KernelFunction', 'gaussian');
CalculateThreshold( xTest, yTest, 75, model, 'South Australia', 'SVM Gaussian');
```

```
SVM Gaussian South Australia TP: 1524 TN: 5230 FP: 367 FN: 1639
```

```
model = fitrlinear(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'South Australia', 'High deminsonal Linear Regres
```

```
High deminsonal Linear Regression South Australia TP: 798 TN: 4931 FP: 666 FN: 2365
```

```
model = fitrtree(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'South Australia', 'Tree Regression');
```

```
Tree Regression South Australia TP: 2240 TN: 4893 FP: 704 FN: 923
```

```
model = fitrensemble(xTrain,yTrain);
CalculateThreshold( xTest, yTest, 75, model, 'South Australia', 'Ensemble of learners for regr
```

```
Ensemble of learners for regression South Australia TP: 1877 TN: 3950 FP: 1647 FN: 1286
```

```
% Test how well a model can predict a value under a threshold across various models using prev
model = fitlm(dateArrayPrevious,qPreviousPrice);
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'linear');
```

```
linear Queensland TP: 4415 TN: 4308 FP: 2164 FN: 6633
```

```
model = fitrgp(dateArrayPrevious,qPreviousPrice, 'KernelFunction','ardsquaredexponential' );
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'Gaussian process regression')
```

```
Gaussian process regression Queensland TP: 7599 TN: 3935 FP: 2537 FN: 3449
```

```
model = fitrsvm(dateArrayPrevious,qPreviousPrice);
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'SVM Linear');
```

```
SVM Linear Queensland TP: 9482 TN: 2008 FP: 4464 FN: 1566
```

```
model = fitrsvm(dateArrayPrevious,qPreviousPrice, 'KernelFunction', 'gaussian');
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'SVM Gaussian');
```

```
SVM Gaussian Queensland TP: 8821 TN: 3208 FP: 3263 FN: 2228
```

```
model = fitrlinear(dateArrayPrevious,qPreviousPrice);
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'High deminsonal Linear Regres
```

```
High deminsonal Linear Regression Queensland TP: 9459 TN: 2110 FP: 4362 FN: 1589
```

```
model = fitrtree(dateArrayPrevious,qPreviousPrice);
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'Tree Regression');
```

```
Tree Regression Queensland TP: 8437 TN: 3344 FP: 3128 FN: 2611
```

```
model = fitrensemble(dateArrayPrevious,qPreviousPrice);
CalculateThreshold( dateArray, qPrice, 75, model, 'Queensland', 'Ensemble of learners for regr
```

```
Ensemble of learners for regression Queensland TP: 7538 TN: 3674 FP: 2798 FN: 3510
```

```
% Test how well a model can predict a value under a threshold across various models using prev
model = fitlm(dateArrayPrevious,saPreviousPrice);
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'linear');
```

```
linear South Australia TP: 2331 TN: 8481 FP: 2689 FN: 4019
```

```
model = fitrgp(dateArrayPrevious,saPreviousPrice, 'KernelFunction','ardsquaredexponential' );
```

```
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'Gaussian process regres
```

```
Gaussian process regression South Australia TP: 3807 TN: 7128 FP: 4043 FN: 2542
```

```
model = fitrsvm(dateArrayPrevious,saPreviousPrice);
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'SVM Linear');
```

```
SVM Linear South Australia TP: 5247 TN: 4574 FP: 6597 FN: 1102
```

```
model = fitrsvm(dateArrayPrevious,saPreviousPrice, 'KernelFunction', 'gaussian');
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'SVM Gaussian');
```

```
SVM Gaussian South Australia TP: 4386 TN: 5835 FP: 5336 FN: 1963
```

```
model = fitrlinear(dateArrayPrevious,saPreviousPrice);
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'High deminsonal Linear
```

```
High deminsonal Linear Regression South Australia TP: 5271 TN: 4689 FP: 6483 FN: 1077
```

```
model = fitrtree(dateArrayPrevious,saPreviousPrice);
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'Tree Regression');
```

```
Tree Regression South Australia TP: 4164 TN: 6168 FP: 5002 FN: 2186
```

```
model = fitrensemble(dateArrayPrevious,saPreviousPrice);
CalculateThreshold( dateArray, saPrice, 75, model, 'South Australia', 'Ensemble of learners fo
```

```
Ensemble of learners for regression South Australia TP: 3840 TN: 6654 FP: 4518 FN: 2508
```

```

```