Regression Basics

Curriculum Module

Created with R2020b. Compatible with R2020b and later releases.

Description

This package contains a *live script* and supporting files to illustrate some basics of regression analysis. The materials are designed to be flexible and can be easily modified to accommodate a variety of teaching and learning methods. We include a brief background, interactive illustrations, tasks, reflection questions, a real-world application example, and a guided exercise for the concepts explored.

Learning Goals

- Define linear, nonlinear, and multiple linear regression.
- Assess and improve the performance of a regression model using a goodness-of-fit measure.
- Apply gradient descent to minimize a cost function.
- Explain the effect of increasing and decreasing the learning rate and number of steps for gradient descent.
- Apply a linear regression model to perform short-term forecasting.

Suggested Prework

MATLAB Onramp – a free two-hour introductory tutorial to learn the essentials of MATLAB.

Details

`regressionBasics.mlx`

An interactive lesson that introduces the fundamentals of regression analysis. Students apply basic linear regression to model real-world electricity load data.
Products: MATLAB, Statistics and Machine Learning Toolbox

`electricityLoadData.mlx`

A supplementary script to download the electricity load data for use in the practice problem.
Products: MATLAB, Statistics and Machine Learning Toolbox

`regressSolnIm/`

This folder contains supplementary image files containing solutions for `regressionBasics.mlx`. The main script provides controls to hide or expose the solutions when needed.

Data files (`*.mat`)

Supplementary data files `linearData.mat`, `linearData2.mat`, `multivariateData.mat`, `nonlinearData.mat` to aid the concepts covered in `regressionBasics.mlx`.