uCertify

Course Outline

Regression Analysis with Python



27 Mar 2024

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1. Course Objective

Get the knowledge to use Python for building fast and better linear models and to deploy the resulting models in Python with uCertify's course Regression Analysis with Python. The course provides hands-on experience of the concepts, Regression – The Workhorse of Data Science, Approaching Simple Linear Regression, Multiple Regression in Action. Logistic Regression, Data Preparation, Achieving Generalization, and so on.

2. Pre-Assessment

Pre-Assessment lets you identify the areas for improvement before you start your prep. It determines what students know about a topic before it is taught and identifies areas for improvement with question assessment before beginning the course.

3. Exercises

There is no limit to the number of times learners can attempt these. Exercises come with detailed remediation, which ensures that learners are confident on the topic before proceeding.



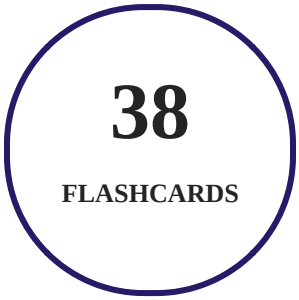
4. Quizzes

Quizzes test your knowledge on the topics of the exam when you go through the course material. There is no limit to the number of times you can attempt it.



5. flashcards

Flashcards are effective memory-aiding tools that help you learn complex topics easily. The flashcard will help you in memorizing definitions, terminologies, key concepts, and more. There is no limit to the number of times learners can attempt these. Flashcards help master the key concepts.



6. Glossary of terms

uCertify provides detailed explanations of concepts relevant to the course through Glossary. It contains a list of frequently used terminologies along with its detailed explanation. Glossary defines the key terms.



7. Expert Instructor-Led Training

uCertify uses the content from the finest publishers and only the IT industry's finest instructors. They have a minimum of 15 years real-world experience and are subject matter experts in their fields. Unlike a live class, you can study at your own pace. This creates a personal learning experience and gives you all the benefit of hands-on training with the flexibility of doing it around your schedule 24/7.

8. ADA Compliant & JAWS Compatible Platform

uCertify course and labs are ADA (Americans with Disability Act) compliant. It is now more accessible to students with features such as:

- Change the font, size, and color of the content of the course
- Text-to-speech, reads the text into spoken words
- Interactive videos, how-tos videos come with transcripts and voice-over
- Interactive transcripts, each word is clickable. Students can clip a specific part of the video by clicking on a word or a portion of the text.

JAWS (Job Access with Speech) is a computer screen reader program for Microsoft Windows that reads the screen either with a text-to-speech output or by a Refreshable Braille display. Student can easily navigate uCertify course using JAWS shortcut keys.

9. State of the Art Educator Tools

uCertify knows the importance of instructors and provide tools to help them do their job effectively. Instructors are able to clone and customize course. Do ability grouping. Create sections. Design grade scale and grade formula. Create and schedule assessments. Educators can also move a student from self-paced to mentor-guided to instructor-led mode in three clicks.

10. Award Winning Learning Platform (LMS)

uCertify has developed an award winning, highly interactive yet simple to use platform. The SIIA CODiE Awards is the only peer-reviewed program to showcase business and education technology's finest products and services. Since 1986, thousands of products, services and solutions have been

recognized for achieving excellence. uCertify has won CODiE awards consecutively for last 7 years:

- **2014**
    1. Best Postsecondary Learning Solution

- **2015**
    1. Best Education Solution
    2. Best Virtual Learning Solution
    3. Best Student Assessment Solution
    4. Best Postsecondary Learning Solution
    5. Best Career and Workforce Readiness Solution
    6. Best Instructional Solution in Other Curriculum Areas
    7. Best Corporate Learning/Workforce Development Solution

- **2016**
    1. Best Virtual Learning Solution
    2. Best Education Cloud-based Solution
    3. Best College and Career Readiness Solution
    4. Best Corporate / Workforce Learning Solution
    5. Best Postsecondary Learning Content Solution
    6. Best Postsecondary LMS or Learning Platform
    7. Best Learning Relationship Management Solution

- **2017**
    1. Best Overall Education Solution
    2. Best Student Assessment Solution
    3. Best Corporate/Workforce Learning Solution
    4. Best Higher Education LMS or Learning Platform

- **2018**
    1. Best Higher Education LMS or Learning Platform

2. Best Instructional Solution in Other Curriculum Areas
3. Best Learning Relationship Management Solution

- **2019**
  1. Best Virtual Learning Solution
  2. Best Content Authoring Development or Curation Solution
  3. Best Higher Education Learning Management Solution (LMS)

- **2020**
  1. Best College and Career Readiness Solution
  2. Best Cross-Curricular Solution
  3. Best Virtual Learning Solution

11. Chapter & Lessons

uCertify brings these textbooks to life. It is full of interactive activities that keeps the learner engaged. uCertify brings all available learning resources for a topic in one place so that the learner can efficiently learn without going to multiple places. Challenge questions are also embedded in the chapters so learners can attempt those while they are learning about that particular topic. This helps them grasp the concepts better because they can go over it again right away which improves learning.

Learners can do Flashcards, Exercises, Quizzes and Labs related to each chapter. At the end of every lesson, uCertify courses guide the learners on the path they should follow.

Syllabus

Chapter 1: Preface

- What this course covers
- What you need for this course
- Who this course is for

- Conventions

Chapter 2: Regression – The Workhorse of Data Science

- Regression analysis and data science
- Python for data science
- Python packages and functions for linear models
- Summary

Chapter 3: Approaching Simple Linear Regression

- Defining a regression problem
- Starting from the basics
- Extending to linear regression
- Minimizing the cost function
- Summary

Chapter 4: Multiple Regression in Action

- Using multiple features
- Revisiting gradient descent
- Estimating feature importance

- Interaction models
- Polynomial regression
- Summary

Chapter 5: Logistic Regression

- Defining a classification problem
- Defining a probability-based approach
- Revisiting gradient descent
- Multiclass Logistic Regression
- An example
- Summary

Chapter 6: Data Preparation

- Numeric feature scaling
- Qualitative feature encoding
- Numeric feature transformation
- Missing data
- Outliers

- Summary

Chapter 7: Achieving Generalization

- Checking on out-of-sample data
- Greedy selection of features
- Regularization optimized by grid-search
- Stability selection
- Summary

Chapter 8: Online and Batch Learning

- Batch learning
- Online mini-batch learning
- Summary

Chapter 9: Advanced Regression Methods

- Least Angle Regression
- Bayesian regression
- SGD classification with hinge loss
- Regression trees (CART)

- Bagging and boosting
- Gradient Boosting Regressor with LAD
- Summary

Chapter 10: Real-world Applications for Regression Models

- Downloading the datasets
- A regression problem
- An imbalanced and multiclass classification problem
- A ranking problem
- A time series problem
- Summary

12. Practice Test

Here's what you get

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PRE-ASSESSMENTS QUESTIONS	POST-ASSESSMENTS QUESTIONS

Features

Each question comes with detailed remediation explaining not only why an answer option is correct but also why it is incorrect.

Unlimited Practice

Each test can be taken unlimited number of times until the learner feels they are prepared. Learner can review the test and read detailed remediation. Detailed test history is also available.

Each test set comes with learn, test and review modes. In learn mode, learners will attempt a question and will get immediate feedback and complete remediation as they move on to the next question. In test mode, learners can take a timed test simulating the actual exam conditions. In review mode, learners can read through one item at a time without attempting it.

13.  Performance Lab Python

uCertify's performance-based labs are simulators that provides virtual environment. Labs deliver hands on experience with minimal risk and thus replace expensive physical labs. uCertify Labs are cloud-based, device-enabled and can be easily integrated with an LMS. Features of uCertify labs:

- Provide hands-on experience in a safe, online environment
- Labs simulate real world, hardware, software & CLI environment
- Flexible and inexpensive alternative to physical Labs
- Comes with well-organized component library for every task
- Highly interactive - learn by doing
- Explanations and remediation available
- Videos on how to perform

Lab Tasks

- Creating a One-Column Matrix Structure
- Visualizing the Distribution of Errors
- Plotting a Normal Distribution Graph
- Plotting a Scatterplot
- Standardizing a Variable
- Showing Regression Analysis Parameters
- Showing the Summary of Regression Analysis
- Printing the Residual Sum of Squared Errors
- Plotting Standardized Residuals
- Predicting with a Regression Model
- Regressing with Scikit-learn
- Using the fmin Minimization Procedure
- Finding Mean and Median
- Obtaining the Inverse of a Matrix
- Printing Eigenvalues
- Visualizing the Correlation Matrix
- Obtaining the Correlation Matrix
- Standardizing Using the Scikit-learn Preprocessing Module
- Printing Standardized Coefficients
- Obtaining the R-squared Baseline
- Recording Coefficient of Determination Using R-squared
- Reporting All R-squared Increment Above 0.03
- Representing LSTAT Using the Scatterplot
- Testing Degree of a Polynomial
- Creating a Dummy Dataset
- Obtaining a Classification Report
- Representing a Confusion Matrix Using Heatmap
- Creating a Confusion Matrix
- Plotting the sigmoid Function
- Fitting a Multiple Linear Regressor
- Creating and Fitting a Logistic Regressor Classifier

- Obtaining the Feature Vector and its Original and Predicted Labels
- Visualizing Multiclass Logistic Regressor
- Creating a Dummy Four-Class Dataset
- Centering the Variables
- Demonstrating the Logistic Regression
- Analyzing Qualitative Data Using Logit
- Transforming Qualitative Data
- Using LabelBinarizer
- Using the Hashing Trick
- Obtaining Residuals
- Replacing Missing Values With the Mean Value
- Representing Outliers Among Predictors
- Showing Outliers
- Splitting a Dataset
- Bootstrapping a Dataset
- Applying Third-Degree Polynomial Expansion
- Plotting the Distribution of Scores
- Demonstrating Working of Recursive Elimination
- Implementing L2 Regularization
- Performing Random Grid Search
- Demonstrating Mini-Batch Learning
- Obtaining LARS Coefficients
- Using Bayesian Regression
- Using the SGDClassifier Class With the hinge Loss
- Implementing SVR
- Implementing CART
- Implementing Random Forest Regressor
- Implementing Bagging
- Implementing Boosting
- Implementing Gradient Boosting Regressor with LAD

Here's what you get

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PERFORMANCE LAB PYTHON

14. Post-Assessment

After completion of the uCertify course Post-Assessments are given to students and often used in conjunction with a Pre-Assessment to measure their achievement and the effectiveness of the exam.

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