

# Glossary

## Advanced Data Analytics

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## Terms and definitions from all courses

### A

**A/B testing:** A way to compare two versions of something to find out which version performs better

**Absolute values:** (Refer to **observed values**)

**Accuracy:** Refers to the proportion of data points that were correctly categorized

**Action:** A Tableau tool to help an audience interact with a visualization or dashboard by allowing control of selection

**Active listening:** Refers to allowing team members, bosses, and other collaborative stakeholders to share their own points of view before offering responses

**AdaBoost:** (Refer to **adaptive boosting**)

**Adaptive boosting:** A boosting methodology where each consecutive base learner assigns greater weight to the observations incorrectly predicted by the preceding learner

**Addition rule (for mutually exclusive events):** The concept that if the events A and B are mutually exclusive, then the probability of A or B happening is the sum of the probabilities of A and B

**Adjusted  $R^2$ :** A variation of  $R^2$  that accounts for having multiple independent variables present in a linear regression model

**Affinity:** The metric used to calculate the distance between points/clusters

**agg():** A pandas groupby method that allows the user to apply multiple calculations to groups of data

**Agglomerative clustering:** A clustering methodology that works by first assigning every point to its own cluster, then progressively combining clusters based on intercluster distance

**Aggregate information:** Data from a significant number of users that has eliminated personal information

**Algorithm:** A set of instructions for solving a problem or accomplishing a task

**Aliasing:** A process that allows the user to assign an alternate name—or alias—to something

**Analysis of Variance (ANOVA):** A group of statistical techniques that test the difference of means between three or more groups

**Analytics Team Manager:** A data professional who supervises analytical strategy for an organization, often managing multiple groups

**Analyze stage:** Stage of the PACE workflow where the necessary data is acquired from primary and secondary sources and then cleaned, reorganized, and analyzed

**ANCOVA (Analysis of Covariance):** A statistical technique that tests the difference of means between three or more groups while controlling for the effects of covariates, or variable(s) irrelevant to the test

**append():** A method that adds an element to the end of a list

**Array:** An ordered collection of items of a single data type

**Array():** A function for converting input to an array

**Argument:** Information given to a function in its parentheses

**Artificial intelligence (AI):** Refers to computer systems able to perform tasks that normally require human intelligence

**Assignment:** The process of storing a value in a variable

**Attribute:** A value associated with an object or class which is referenced by name using dot notation

**Average:** The distance between each cluster's centroid and other clusters' centroids

## B

**Backward elimination:** A stepwise variable selection process that begins with the full model, with all possible independent variables, and removes the independent variable that adds the least explanatory power to the model

**Bagging:** A technique used by certain kinds of models that use ensembles of base learners to make predictions; refers to the combination of bootstrapping and aggregating

**Base learner:** Each individual model that comprises an ensemble

**Bayes' rule:** (Refer to **Bayes' theorem**)

**Bayes' theorem:** An equation that can be used to calculate the probability of an outcome or class, given the values of predictor variables

**Bayesian inference:** (Refer to **Bayesian statistics**)

**Bayesian statistics:** A powerful method for analyzing and interpreting data in modern data analytics; also referred to as Bayesian inference

**Best fit line:** The line that fits the data best by minimizing some loss function or error

**Bias:** In data structuring, refers to organizing data results in groupings, categories, or variables that are misrepresentative of the whole dataset

**Bias-variance trade-off:** Balance between two model qualities, bias and variance, to minimize overall error for unobserved data

**Bin:** A segment of data that groups values into categories

**Binning:** Grouping continuous values into a smaller number of categories, or intervals

**Binomial distribution:** A discrete distribution that models the probability of events with only two possible outcomes: success or failure

**Binomial logistic regression:** A technique that models the probability of an observation falling into one of two categories, based on one or more independent variables

**Binomial logistic regression linearity assumption:** An assumption stating that there should be a linear relationship between each X variable and the logit of the probability that Y equals one

**Black-box model:** Any model whose predictions cannot be precisely explained

**Boolean:** A data type that has only two possible values, usually true or false

**Boolean data:** A data type that has only two possible values, usually true or false

**Boolean masking:** A filtering technique that overlays a Boolean grid onto a dataframe in order to select only the values in the dataframe that align with the True values of the grid

**Boosting:** A technique that builds an ensemble of weak learners sequentially, with each consecutive learner trying to correct the errors of the one that preceded it

**Bootstrapping:** Refers to sampling with replacement

**Box plot:** A data visualization that depicts the locality, spread, and skew of groups of values within quartiles

**Branching:** The ability of a program to alter its execution sequence

**break:** A keyword that lets a user escape a loop without triggering any ELSE statement that follows it in the loop

**Business Intelligence Analyst:** (Refer to **Business Intelligence Engineer**)

**Business Intelligence Engineer:** A data professional who uses their knowledge of business trends and databases to organize information and make it accessible; also referred to as a Business Intelligence Analyst

## C

**Categorical data:** Data that is divided into a limited number of qualitative groups

**Categorical variables:** Variables that contain a finite number of groups or categories

**Causation:** Describes a cause-and-effect relationship where one variable directly causes the other to change in a particular way

**Cells:** The modular code input and output fields into which Jupyter Notebooks are partitioned

**Central Limit Theorem:** The idea that the sampling distribution of the mean approaches a normal distribution as the sample size increases

**Centroid:** The center of a cluster determined by the mathematical mean of all the points in that cluster

**Chi-squared ( $\chi^2$ ) Goodness of Fit Test:** A hypothesis test that determines whether an observed categorical variable follows an expected distribution

**Chi-squared ( $\chi^2$ ) Test for Independence:** A hypothesis test that determines whether or not two categorical variables are associated with each other

**Chief Data Officer:** An executive-level data professional who is responsible for the consistency, accuracy, relevancy, interpretability, and reliability of the data a team provides

**Child node:** A node that is pointed to from another node

**Class imbalance:** When a dataset has a predictor variable that contains more instances of one outcome than another

**Class:** An object's data type that bundles data and functionality together

**Classical probability:** A type of probability based on formal reasoning about events with equally likely outcomes

**Cleaning:** The process of removing errors that might distort your data or make it less useful; one of the six practices of EDA

**Cluster random sample:** A probability sampling method that divides a population into clusters, randomly selects certain clusters, and includes all members from the chosen clusters in the sample

**Collaborative filtering:** A technique used by recommendation systems to make comparisons based on who else liked the content

**Collective outliers:** A group of abnormal points, following similar patterns and isolated from the rest of the population

**Comparator:** An operator that compares two values and produces Boolean values (True/False)

**Complement of an event:** In statistics, refers to an event not occurring

**Complement rule:** A concept stating that the probability that event A does not occur is one minus the probability of A

**Complete:** The maximum pairwise distance between clusters

**Composition:** Refers to defining attributes and methods at the instance level to have a more differentiated relationship between objects in the same class

**Computer programming:** The process of giving instructions to a computer to perform an action or set of actions

**concat():** A pandas function that combines data either by adding it horizontally as new columns for existing rows or vertically as new rows for existing columns

**Concatenate:** To link or join together

**Concatenation:** Refers to building longer strings out of smaller strings

**Conditional probability:** Refers to the probability of an event occurring given that another event has already occurred

**Conditional statement:** A section of code that directs the execution of programs

**Confidence band:** The area surrounding a line that describes the uncertainty around the predicted outcome at every value of X

**Confidence interval:** A range of values that describes the uncertainty surrounding an estimate

**Confidence level:** A measure that expresses the uncertainty of the estimation process

**Confusion matrix:** A graphical representation of how accurate a classifier is at predicting the labels for a categorical variable

**Construct stage:** Stage of the PACE workflow where data models and machine learning algorithms are built, interpreted, and revised to uncover relationships within the data and help unlock insights from those relationships

**Constructor:** A special method to add values to an instance in object creation

**Content-based filtering:** A technique used by recommendation systems to make comparisons based on attributes of content

**Contextual outliers:** Normal data points under certain conditions but become anomalies under most other conditions

**Continuous random variable:** A variable that takes all the possible values in some range of numbers

**Continuous:** A mathematical concept indicating that a measure or dimension has an infinite and uncountable number of outcomes

**Continuous variables:** Variables that can take on an infinite and uncountable set of values

**Convenience sample:** A non-probability sampling method that involves choosing members of a population that are easy to contact or reach

**Correlation:** Measures the way two variables tend to change together

**Cross-validation:** A process that uses different portions of the data to test and train a model on different iterations

**CSV file:** A plaintext file that uses commas to separate distinct values from one another; Stands for "comma-separated values"

**Customer churn:** The business term that describes how many and at what rate customers stop using a product or service, or stop doing business with a company

## D

**Data anonymization:** The process of protecting people's private or sensitive data by eliminating PII

**Data cleaning:** The process of formatting data and removing unwanted material

**Data engineer:** A data professional who makes data accessible, ensures data ecosystems offer reliable results, and manages infrastructure for data across enterprises

**Data ethics:** Well-founded standards of right and wrong that dictate how data is collected, shared, and used

**Data governance:** A process for ensuring the formal management of a company's data assets

**Data professional:** Any individual who works with data and/or has data skills

**Data science:** The discipline of making data useful

**Data scientist:** A data professional who works closely with analytics to provide meaningful insights that help improve current business operations

**Data source:** The location where data originates

**Data stewardship:** The practices of an organization that ensures that data is accessible, usable, and safe

**Data structure:** A collection of data values or objects that contain different data types

**Data type:** An attribute that describes a piece of data based on its values, its programming language, or the operations it can perform

**DataFrame:** A two-dimensional, labeled data structure with rows and columns

**Data visualization:** A graph, chart, diagram, or dashboard that is created as a representation of information

**Database (DB) file:** A file type used to store data, often in tables, indexes, or fields

**Dataframe:** A two-dimensional data-structure organized into rows and columns



**DBSCAN:** A clustering methodology that searches data space for continuous regions of high density; stands for “density-based spatial clustering of applications with noise”

**Debugging:** Troubleshooting, or searching for errors in a script or program

**Decision node:** A node of the tree where decisions are made

**Decision tree:** A flowchart-like structure that uses branching paths to predict the outcomes of events, or the probability of certain outcomes

**Deduplication:** The elimination or removal of matching data values in a dataset

**def:** A keyword that defines a function at the start of the function block

**Dependent events:** The concept that two events are dependent if one event changes the probability of the other event

**Dependent variable (Y):** The variable a given model estimates

**Describe():** A function that returns the statistical summary of a dataframe or series, including mean, standard deviation, and minimum and maximum column values.

**Descriptive statistics:** A type of statistics that summarizes the main features of a dataset

**dict():** A function used to create a dictionary

**Dictionary:** A data structure that consists of a collection of key-value pairs

**difference():** A function that finds the elements present in one set but not the other

**Dimensions:** Qualitative data values used to categorize and group data to reveal details about it

**Discovering:** The process data professionals use to familiarize themselves with the data so they can start conceptualizing how to use it; one of the six practices of EDA

**Discrete features:** Features with a countable number of values between any two values

**Discrete random variable:** A variable that has a countable number of possible values

**Discrete:** A mathematical concept indicating that a measure or dimension has a finite and countable number of outcomes

**distance\_threshold:** A hyperparameter in agglomerative clustering models that determines the distance above which clusters will not be merged

**Documentation:** An in-depth guide that is written by the developers who created a package that features very specific information on various functions and features

**Documentation string:** A group of text that explains what a method or function does; also referred to as a “docstring”

**Dot notation:** How to access the methods and attributes that belong to an instance of a class

**Downsampling:** The process of removing some observations from the majority class, making it so they make up a smaller percentage of the dataset than before

**Dummy variables:** Variables with values of 0 or 1 that indicate the presence or absence of something

**dtype:** A NumPy attribute used to check the data type of the contents of an array

**Dynamic typing:** Variables that can point to objects of any data type

**Dynamic value:** A value the user inputs or the output of a program, an operation, or a function

## E

**Econometrics:** A branch of economics that uses statistics to analyze economic problems

**Edge computing:** A way of distributing computational tasks over a bunch of nearby processors (i.e., computers) that is good for speed and resiliency and does not depend on a single source of computational power

**elif:** A reserved keyword that executes subsequent conditions when the previous conditions are not true

**else:** A reserved keyword that executes when preceding conditions evaluate as False

**Empirical probability:** A type of probability based on experimental or historical data

**Empirical rule:** A concept stating that the values on a normal curve are distributed in a regular pattern, based on their distance from the mean

**Ensemble learning:** Refers to building multiple models and aggregating their predictions

**Ensembling:** (Refer to **ensemble learning**)

**Enumerate():** A built-in function that iterates through a sequence and tracks each element and its place in the index

**eps (Epsilon):** In DBSCAN clustering models, a hyperparameter that determines the radius of a search area from any given point

**Errors:** In a regression model, the natural noise assumed to be in a model

**Escape character:** A character that changes the typical behavior of the characters that follow it

**Execute stage:** Stage of the PACE workflow where a data professional will present findings with internal and external stakeholders, answer questions, consider different viewpoints, and make recommendations

**Explanatory variable:** (Refer to **independent variable**)

**Explicit conversion:** The process of converting a data type of an object to a required data type

**Exploratory data analysis (EDA):** The process of investigating, organizing, and analyzing datasets and summarizing their main characteristics, often by employing data wrangling and

visualization methods; the six main practices of EDA are: discovering, structuring, cleaning, joining, validating, and presenting

**Expression:** A combination of numbers, symbols, or other variables that produce a result when evaluated

**Extra Sum of Squares F-test:** Quantifies the difference between the amount of variance that is left unexplained by a reduced model that is explained by the full model

**Extracting:** The process of retrieving data out of data sources for further data processing

**Extrapolation:** A model's ability to predict new values that fall outside of the range of values in the training data

## F

**F1-Score:** The harmonic mean of precision and recall

**False positive:** A test result that indicates something is present when it really is not

**Feature engineering:** The process of using practical, statistical, and data science knowledge to select, transform, or extract characteristics, properties, and attributes from raw data

**Feature extraction:** A type of feature engineering that involves taking multiple features to create a new one that would improve the accuracy of the algorithm

**Feature selection:** A type of feature engineering that involves selecting the features in the data that contribute the most to predicting the response variable

**Feature transformation:** A type of feature engineering that involves modifying existing features in a way that improves accuracy when training the model

**Filtering:** The process of selecting a smaller part of a dataset based on specified values and using it for viewing or analysis

**First-party data:** Data that was gathered from inside your own organization

**Float:** A data type that represents numbers that contain decimals

**For loop:** A piece of code that iterates over a sequence of values

**format():** A string method that formats and inserts specific substrings into designated places within a larger string

**Forward selection:** A stepwise variable selection process that begins with the null model—with zero independent variables—and considers all possible variables to add; incorporates the independent variable that contributes the most explanatory power to the model

**Function:** A body of reusable code for performing specific processes or tasks

## G

**Generator():** A function that returns an object (iterator) which can be iterated over (one value at a time)

**Global outliers:** Values that are completely different from the overall data group and have no association with any other outliers

**Global variable:** A variable that can be accessed from anywhere in a program or script

**Gradient boosting machines (GBMs):** Model ensembles that use gradient boosting

**Gradient boosting:** A boosting methodology where each base learner in the sequence is built to predict the residual errors of the model that preceded it

**GridSearch:** A tool to confirm that a model achieves its intended purpose by systematically checking every combination of hyperparameters to identify which set produces the best results, based on the selected metric

**groupby():** A pandas DataFrame method that groups rows of the dataframe together based on their values at one or more columns, which allows further analysis of the groups

**Grouping:** The process of aggregating individual observations of a variable into groups

## H

**Hackathon:** An event where programmers and data professionals come together and work on a project

**Head():** A function that returns a preview of the column names and the first few rows of a dataset

**Heatmap:** A type of data visualization that depicts the magnitude of an instance or set of values based on two colors

**Help():** A Python help function used to display the documentation of modules, functions, classes, keywords, and more

**Histogram:** A data visualization that depicts an approximate representation of the distribution of values in a dataset

**Hold-out sample:** A random sample of observed data that is not used to fit the model

**Homoscedasticity assumption:** An assumption of simple linear regression stating that the variation of the residuals (errors) is constant or similar across the model

**Hyperparameters:** Parameters that can be set by the modeler before the model is trained

**Hyperparameter tuning:** Refers to changing parameters that directly affect how the model trains, before the learning process begins

**Hypothesis:** A theory or an explanation, based on evidence, that has not yet been refuted

**Hypothesis testing:** A statistical procedure that uses sample data to evaluate an assumption about a population parameter

I

**if:** A reserved keyword that sets up a condition in Python

**iloc[]:** A type of notation in pandas that indicates when the user wants to select by integer-location-based position

**Immutability:** The concept that a data structure or element's values can never be altered or updated

**Immutable data type:** A data type in which the values can never be altered or updated

**Implicit conversion:** The process Python uses to automatically convert one data type to another without user involvement

**Import statement:** A statement that uses the import keyword to load an external library, package, module, or function into the computing environment

**Independent events:** The concept that two events are independent if the occurrence of one event does not change the probability of the other event

**Independent observation assumption:** An assumption of simple linear regression stating that each observation in the dataset is independent

**Independent variable (X):** The variable whose trends are associated with the dependent variable

**index():** A string method that outputs the index number of a character in a string

**Indexing:** A way to refer to the individual items within an iterable by their relative position

**Inertia:** The sum of the squared distances between each observation and its nearest centroid

**Inferential statistics:** A type of statistics that uses sample data to draw conclusions about a larger population

**Info():** Gives the total number of entries, along with the data types—called Dtypes in pandas—of the individual entries

**Inheritance:** Refers to letting a programmer build relationships between concepts and group them together to reduce code duplication

**Inner join:** A way of combining data such that only the keys that are in both dataframes get included in the merge

**Input validation:** The practice of thoroughly analyzing and double-checking to make sure data is complete, error-free, and high-quality

**Input:** Information entered into a program

**input():** A Python function that can be used to ask a question in a message and store the answer in a variable

**insert():** A function that takes an index as the first parameter and an element as the second parameter, then inserts the element into a list at the given index

**Instance variable:** A variable that is declared in a class outside of other methods or blocks

**Instantiation:** Refers to creating a copy of the class that inherits all class variables and methods

**Int64:** A standard integer data type, representing numbers somewhere between negative nine quintillion and positive nine quintillion

**Integer:** A data type used to represent whole numbers without fractions

**Integrated Development Environment (IDE):** A piece of software that has an interface to write, run, and test a piece of code

**Interaction term:** Represents how the relationship between two independent variables is associated with changes in the mean of the dependent variable

**Intercept (constant  $B_0$ ):** The y value of the point on the regression line where it intersects with the y-axis

**Interpersonal skills:** Traits that focus on communicating and building relationships

**Interquartile range:** The distance between the first quartile (Q1) and the third quartile (Q3)

**intersection():** A function that finds the elements that two sets have in common

**Interval:** A sample statistic plus or minus the margin of error

**Interval estimate:** A calculation that uses a range of values to estimate a population parameter

**Is:** A rule that checks objects and classes for ancestry

**items():** A dictionary method to retrieve both the dictionary's keys and values

**Iterable:** An object that's looped, or iterated, over



**Iteration:** The repeated execution of a set of statements, where one iteration is the single execution of a block of code

## J

**Joining:** The process of augmenting data by adding values from other datasets; one of the six practices of EDA

**JSON file:** A data storage file that is saved in a JavaScript format

**Jupyter Notebook:** An open-source web application for creating and sharing documents containing live code, mathematical formulas, visualizations, and text

## K

**K-means:** An unsupervised partitioning algorithm used to organize unlabeled data into groups, or clusters

**Kernel:** An underlying core program, like Python

**Keys:** The shared points of reference between different dataframes

**keys():** A dictionary method to retrieve only the dictionary's keys

**Keyword:** A special word in a programming language that is reserved for a specific purpose and that can only be used for that purpose

## L

**Label encoding:** Data transformation technique where each category is assigned a unique number instead of a qualitative value

**Large Language Model (LLM):** A type of AI algorithm that uses deep learning techniques to identify patterns in text and map how different words and phrases relate to each other

**Leaf node:** The nodes where a final prediction is made

**learning\_rate:** In XGBoost, a hyperparameter that specifies how much weight is given to each consecutive tree's prediction in the final ensemble

**Left join:** A way of combining data such that all of the keys in the left dataframe are included, even if they aren't in the right dataframe

**Len():** A function used to measure the length of strings

**Library:** A reusable collection of code; also referred to as a "package"

**Likelihood:** The probability of observing the actual data, given some set of beta parameters

**Line:** A collection of an infinite number of points extending in two opposite directions

**Linear regression:** A technique that estimates the linear relationship between a continuous dependent variable and one or more independent variables

**Linearity assumption:** An assumption of simple linear regression stating that each predictor variable ( $X_i$ ) is linearly related to the outcome variable ( $Y$ )

**Link function:** A nonlinear function that connects or links the dependent variable to the independent variables mathematically

**Linkage:** The method used to determine which points/clusters to merge

**List:** A data structure that helps store and manipulate an ordered collection of items

**List comprehension:** Formulaic creation of a new list based on the values in an existing list

**Literacy rate:** The percentage of the population in a given age group that can read and write

**loc[]:** Notation that is used to select pandas rows and columns by name

**Log-Odds function:** (Refer to **logit**)

**Logical operator:** An operator that connects multiple statements together and performs complex comparisons

**Logistic regression:** A technique that models a categorical dependent variable (Y) based on one or more independent variables (X)

**Logit:** The logarithm of the odds of a given probability

**Loop:** A block of code used to carry out iterations

**Loss function:** A function that measures the distance between the observed values and the model's estimated values

**Lower limit:** When constructing an interval, the calculation of the sample means minus the margin of error

## M

**Machine learning:** The use and development of algorithms and statistical models to teach computer systems to analyze and discover patterns in data

**MAE (Mean Absolute Error):** The average of the absolute difference between the predicted and actual values

**Magic commands:** Commands that are built into IPython to simplify common tasks

**Magics:** (Refer to **magic commands**)

**MANCOVA (Multivariate Analysis of Covariance):** An extension of ANCOVA and MANOVA that compares how two or more continuous outcome variables vary according to categorical independent variables, while controlling for covariates

**MANOVA (Multivariate Analysis of Variance):** An extension of ANOVA that compares how two or more continuous outcome variables vary according to categorical independent variables

**Margin of error:** The maximum expected difference between a population parameter and a sample estimate

**Markdown:** A markup language that lets the user write formatted text in a coding environment or plain-text editor

**matplotlib:** A library for creating static, animated, and interactive visualizations in Python

**max\_depth:** In tree-based models, a hyperparameter that controls how deep each base learner tree will grow

**max\_features:** In decision tree and random forest models, a hyperparameter that specifies the number of features that each tree randomly selects during training called “colsample\_bytree” in XGBoost

**Maximum Likelihood Estimation (MLE):** A technique for estimating the beta parameters that maximizes the likelihood of the model producing the observed data

**Mean:** The average value in a dataset

**Measure of central tendency:** A value that represents the center of a dataset

**Measure of dispersion:** A value that represents the spread of a dataset, or the amount of variation in data points

**Measure of position:** A method by which the position of a value in relation to other values in a dataset is determined

**Measures:** Numeric values that can be aggregated or placed in calculations

**Median:** The middle value in a dataset

**Mentor:** Someone who shares knowledge, skills, and experience to help another grow both professionally and personally

**merge():** A pandas function that joins two dataframes together; it only combines data by extending along axis one horizontally

**Merging:** A method to combine two (or more) different dataframes along a specified starting column(s)

**Method:** A function that belongs to a class and typically performs an action or operation

**Metrics:** Methods and criteria used to evaluate data

**min\_child\_weight:** In XGBoost models, a hyperparameter indicating that a tree will not

split a node if it results in any child node with less weight than this value called “min\_samples\_leaf” in decision tree and random forest models

**min\_samples:** In DBSCAN clustering models, a hyperparameter that specifies the number of samples in an  $\epsilon$ -neighborhood for a point to be considered a core point (including itself)

**min\_samples\_leaf:** In decision tree and random forest models, a hyperparameter that defines the minimum number of samples for a leaf node called “min\_child\_weight” in XGBoost

**min\_samples\_split:** In decision tree and random forest models, a hyperparameter that defines the minimum number of samples that a node must have to split into more nodes

**Missing data:** A data value that is not stored for a variable in the observation of interest

**Mode:** The most frequently occurring value in a dataset

**Model assumptions:** Statements about the data that must be true in order to justify the use of a particular modeling technique

**Model selection:** The process of determining which model should be the final product and put into production

**Model validation:** The set of processes and activities intended to verify that models are performing as expected

**Modularity:** The ability to write code in separate components that work together and that can be reused for other programs

**Module:** A simple Python file containing a collection of functions and global variables

**Modulo:** An operator that returns the remainder when one number is divided by another

**MSE (Mean Squared Error):** The average of the squared difference between the predicted and actual values

**Multiple linear regression:** A technique that estimates the relationship between one continuous dependent variable and two or more independent variables

**Multiple regression:** (Refer to multiple linear regression)

**Multiplication rule (for independent events):** The concept that if the events A and B are independent, then the probability of both A and B happening is the probability of A multiplied by the probability of B

**Mutability:** The ability to change the internal state of a data structure

**Mutually exclusive:** The concept that two events are mutually exclusive if they cannot occur at the same time

## N

**n\_clusters:** In K-means and agglomerative clustering models, a hyperparameter that specifies the number of clusters in the final model

**N-dimensional array:** The core data object of NumPy; also referred to as “ndarray”

**n\_estimators:** In random forest and XGBoost models, a hyperparameter that specifies the number of trees your model will build in its ensemble

**Naive Bayes:** A supervised classification technique that is based on Bayes’s Theorem with an assumption of independence among predictors

**Naming conventions:** Consistent guidelines that describe the content, creation date, and version of a file in its name

**Naming restrictions:** Rules built into the syntax of a programming language

**NaN:** How null values are represented in pandas; stands for “not a number”

**ndim:** A NumPy attribute used to check the number of dimensions of an array

**Negative correlation:** An inverse relationship between two variables, where when one variable increases, the other variable tends to decrease, and vice versa

**Nested loop:** A loop inside of another loop

**No multicollinearity assumption:** An assumption of simple linear regression stating that no two independent variables ( $X_i$  and  $X_j$ ) can be highly correlated with each other

**Non-null count:** The total number of data entries for a data column that are not blank

**Non-probability sampling:** A sampling method that is based on convenience or the personal preferences of the researcher, rather than random selection

**None:** A special data type in Python used to indicate that things are empty or that they return nothing

**Nonprofit:** A group organized for purposes other than generating profit; often aims to further a social cause or provide a benefit to the public

**Nonresponse bias:** Refers to when certain groups of people are less likely to provide responses

**Normal distribution:** A continuous probability distribution that is symmetrical on both sides of the mean and bell-shaped

**Normality assumption:** An assumption of simple linear regression stating that the residuals are normally distributed

**NumPy:** An essential library that contains multidimensional array and matrix data structures and functions to manipulate them



**Object:** A collection of data that consists of variables and methods or functions

**Object type:** A component category, usually associated with its respective class

**Object-oriented programming:** A programming system that is based around objects which can contain both data and code that manipulates that data

**Objective probability:** A type of probability based on statistics, experiments, and mathematical measurements

**Observed values:** The existing sample of data, where each data point in the sample is represented by an observed value of the dependent variable and an observed value of the independent variable

**One hot encoding:** A data transformation technique that turns one categorical variable into several binary variables

**One-Way ANOVA:** A type of statistical testing that compares the means of one continuous dependent variable based on three or more groups of one categorical variable

**Open data:** Data that is available to the public and free to use, with guidance on how to navigate the datasets and acknowledge the source

**Ordinary least squares estimation (OLS):** A common way to calculate linear regression coefficients

**Outcome variable (Y):** (Refer to dependent variable)

**Outer join:** A way of combining data such that all of the keys from both dataframes get included in the merge

**Outliers:** Observations that are an abnormal distance from other values or an overall pattern in a data population

**Output:** A message stating what to do next

**Overfitting:** When a model fits the observed or training data too specifically and is unable to generate suitable estimates for the general population

## P

**P-value:** The probability of observing results as extreme as those observed when the null hypothesis is true

**PACE:** A workflow data professionals can use to remain focused on the end goal of any given dataset; stands for plan, analyze, construct, and execute

**Package:** A fundamental unit of shareable code that others have developed for a specific purpose

**pandas:** A powerful library built on top of NumPy that's used to manipulate and analyze tabular data



**Parameter:** A characteristic of a population

**Percentile:** The value below which a percentage of data falls

**Personally identifiable information (PII):** Information that permits the identity of an individual to be inferred by either direct or indirect means

**Plan stage:** Stage of the PACE workflow where the scope of a project is defined and the informational needs of the organization are identified

**Point estimate:** A calculation that uses a single value to estimate a population parameter

**Poisson distribution:** A probability distribution that models the probability that a certain number of events will occur during a specific time period

**pop():** A method that extracts an element from a list by removing it at a given index

**Popularity bias:** The phenomenon of more popular items being recommended too frequently

**Population:** Every possible element that a data professional is interested in measuring

**Population proportion:** The percentage of individuals or elements in a population that share a certain characteristic

**Positive correlation:** A relationship between two variables that tend to increase or decrease together.

**Post hoc test:** An ANOVA test that performs a pairwise comparison between all available groups while controlling for the error rate

**Posterior probability:** The probability of an event occurring after taking into consideration new information

**Precision:** The proportion of positive predictions that were correct to all positive predictions

**Predicted values:** The estimated Y values for each X calculated by a model

**Predictor variable:** (Refer to independent variable)

**Presenting:** The process of making a cleaned dataset available to others for analysis or further modeling; one of the six practices of EDA

**Prior probability:** Refers to the probability of an event before new data is collected

**Probability:** The branch of mathematics that deals with measuring and quantifying uncertainty

**Probability distribution:** A function that describes the likelihood of the possible outcomes of a random event

**Probability sampling:** A sampling method that uses random selection to generate a sample

**Program:** A series of instructions written so that a computer can perform a certain task, independent of any other application

**Programming languages:** The words and symbols used to write instructions for computers to follow

**Purposive sample:** A method of non-probability sampling that involves researchers selecting participants based on the purpose of their study

**Python:** A general-purpose programming language

## Q

**Quartile:** A value that divides a dataset into four equal parts

## R

**R<sup>2</sup> (The Coefficient of Determination):** Measures the proportion of variation in the dependent variable, Y, explained by the independent variable(s), X

**RACI chart:** A visual that helps to define roles and responsibilities for individuals or teams to ensure work gets done efficiently; lists who is responsible, accountable, consulted, and informed for project tasks

**Random experiment:** A process whose outcome cannot be predicted with certainty

**Random forest:** An ensemble of decision trees trained on bootstrapped data with randomly selected features

**Random seed:** A starting point for generating random numbers

**Random variable:** A variable that represents the values for the possible outcomes of a random event

**Range:** The difference between the largest and smallest value in a dataset

**range():** A Python function that returns a sequence of numbers starting from zero, increments by 1 by default, and stops before the given number

**Recall:** The proportion of actual positives that were identified correctly to all actual positives

**Recommendation systems:** Unsupervised learning techniques that use unlabeled data to offer relevant suggestions to users

**Refactoring:** The process of restructuring code while maintaining its original functionality

**Regression analysis:** A group of statistical techniques that use existing data to estimate the relationships between a single dependent variable and one or more independent variables

**Regression coefficient:** The estimated betas in a regression model

**Regression models:** (Refer to **regression analysis**)

**Regularization:** A set of regression techniques that shrinks regression coefficient estimates towards zero, adding in bias, to reduce variance

**remove():** A method that removes an element from a list

**Representative sample:** A sample that accurately reflects the characteristics of a population

**reshape():** A NumPy method used to change the shape of an array

**Residual:** The difference between observed or actual values and the predicted values of the regression line

**Response variable:** (Refer to **dependent variable**)

**return:** A reserved keyword in Python that makes a function produce new results which are saved for later use

**Reusability:** The capability to define code once and using it many times without having to rewrite it

**Right join:** A way of combining data such that all the keys in the right dataframe are included—even if they aren't in the left dataframe

**Root node:** The first node of the tree, where the first decision is made

## S

**Sample:** A segment of a population that is representative of the entire population

**Sample size:** The number of individuals or items chosen for a study or experiment

**Sample space:** The set of all possible values for a random variable

**Sampling:** The process of selecting a subset of data from a population

**Sampling bias:** Refers to when a sample is not representative of the population as a whole

**Sampling distribution:** A probability distribution of a sample statistic

**Sampling frame:** A list of all the items in a target population

**Sampling variability:** Refers to how much an estimate varies between samples

**Sampling with replacement:** Refers to when a population element can be selected more than one time

**Sampling without replacement:** Refers to when a population element can be selected only one time

**Scatterplot matrix:** A series of scatterplots that show the relationships between pairs of variables

**Script:** A collection of commands in a file designed to be executed like a program

**Seaborn:** A visualization library based on matplotlib that provides a simpler interface for working with common plots and graphs

**Second-party data:** Data that was gathered outside your organization directly from the original source

**Self:** A parameter passed to a method or attributes used to instantiate an object

**Self-documenting code:** Code written in a way that is readable and makes its purpose clear

**Semantics:** Refers to the variables and objects that give meaning to Python code

**Sequence:** A positionally-ordered collection of items

**Series:** A one-dimensional labeled array capable of holding any data type

**Set:** A data structure in Python that contains only unordered, non-interchangeable elements; a Tableau term for a custom field of data created from a larger dataset based on custom conditions

**Set():** A function that takes an iterable as an argument and returns a new set object

**shape:** A NumPy attribute used to check the shape of an array

**Shrinkage:** (Refer to **learning\_rate**)

**Simple random sample:** A probability sampling method in which every member of a population is selected randomly and has an equal chance of being chosen

**Silhouette analysis:** The comparison of different models' silhouette scores

**Silhouette score:** The mean of the silhouette coefficients of all the observations in a

model

**Simple linear regression:** A technique that estimates the linear relationship between one independent variable, X, and one continuous dependent variable, Y

**Simple random sample:** A probability sampling method in which every member of a population is selected randomly and has an equal chance of being chosen

**Single:** The minimum pairwise distance between clusters

**Slicing:** A method for breaking information down into smaller parts to facilitate efficient examination and analysis from different viewpoints

**Slope:** The amount that y increases or decreases per one-unit increase of x

**Snowball sample:** A method of non-probability sampling that involves researchers recruiting initial participants to be in a study and then asking them to recruit other people to participate in the study

**Sorting:** The process of arranging data into a meaningful order for analysis

**Standard deviation:** A statistic that calculates the typical distance of a data point from the mean of a dataset

**Standard error:** The standard deviation of a sample statistic

**Standard error of the mean:** The sample standard deviation divided by the square root of the sample size

**Standard error of the proportion:** The square root of the sample proportion times one minus the sample proportion divided by the sample size

**Standardization:** The process of putting different variables on the same scale

**Statistic:** A characteristic of a sample

**Statistical significance:** The claim that the results of a test or experiment are not explainable by chance alone

**Statistics:** The study of the collection, analysis, and interpretation of data

**Story:** A Tableau term for a group of dashboards or worksheets assembled into a presentation

**Stratified random sample:** A probability sampling method that divides a population into groups and randomly selects some members from each group to be in the sample

**String:** A sequence of characters and punctuation that contains textual information

**String literal:** A programming string used in code in which characters exist as the value themselves, rather than as variables

**String slice:** The portion of a string that can contain more than one character; also referred to as a substring

**Structuring:** The process of taking raw data and organizing or transforming it to be more easily visualized, explained, or modeled; one of the six practices of EDA

**Subjective probability:** A type of probability based on personal feelings, experience, or judgment

**Sum of squared residuals (SSR):** The sum of the squared difference between each observed value and its associated predicted value

**Summary statistics:** A method that summarizes data using a single number

**Supervised machine learning:** A category of machine learning that uses labeled datasets to train algorithms to classify or predict outcomes

**Supervised model:** A machine learning model that is used to make predictions about unseen events

**`symmetric_difference()`:** A function that finds elements from both sets that are mutually not present in the other

**Syntax:** The structure of code words, symbols, placement, and punctuation

**Systematic random sample:** A probability sampling method that puts every member of a population into an ordered sequence, chooses a random starting point in the sequence, and selects members for the sample at regular intervals

## T

**Tableau:** A business intelligence and analytics platform that helps people visualize, understand, and make decisions with data

**Tabular data:** Data that is in the form of a table, with rows and columns

**Target population:** The complete set of elements that someone is interested in knowing more about

**Third-party data:** Data gathered outside your organization and aggregated

**Tolist():** A NumPy method to convert arrays into lists

**Tree-based learning:** A type of supervised machine learning that performs classification and regression tasks

**Tuple:** An immutable sequence that can contain elements of any data type

**tuple():** A function that transforms input into tuples

**Two-Way ANOVA:** A type of statistical testing that compares the means of one continuous dependent variable based on three or more groups of two categorical variables

**type():** A function used to identify the type of data in a list

## U

**Undercoverage bias:** Refers to when some members of a population are inadequately represented in a sample

**union():** A function that finds all the elements from both sets

**Unsupervised model:** A machine learning model that is used to discover the natural structure of the data, finding relationships within unlabeled data



**Upper limit:** When constructing an interval, the calculation of the sample means plus the margin of error

**Upsampling:** The process of taking observations from the minority class and either adding copies of those observations to the dataset or generating new observations to add to the dataset

## V

**Validating:** The process of verifying that the data is consistent and high quality; one of the six practices of EDA

**values():** A dictionary method to retrieve only the dictionary's values

**Variable:** A named container which stores values in a reserved location in the computer's memory

**Variable selection:** The process of determining which variables or features to include in a given model

**Variance inflation factors (VIF):** Quantifies how correlated each independent variable is with all of the other independent variables

**Variance:** Refers to model flexibility and complexity, so the model learns from existing data; the average of the squared difference of each data point from the mean

**Vectorization:** A process that enables operations to be performed on multiple components of a data object at the same time

**Voluntary response sample:** A method of non-probability sampling that consists of members of a population who volunteer to participate in a study

## W

**Ward:** Merges two clusters whose merging will result in the lowest inertia

**Weak learner:** A model that performs slightly better than randomly guessing

**While loop:** A loop that instructs the computer to continuously execute the code based on the value of a condition

## X

**XGBoost (extreme gradient boosting):** An optimized GBM package

## Z

**Zero Frequency problem:** Occurs when the dataset has no occurrences of a class label and some value of a predictor variable together

**Z-score:** A measure of how many standard deviations below or above the population mean a data point is