CHANDIGARH UNIVERSITY

CU CHANDIGARH UNIVERSITY

Discover. Learn. Empower.

Apex Institute of Technology

Department of Computer Science & Engineering

Introduction to Data Science

Topic: Types of Analytics (Statistics)

Part-2

Dr. Jitender Kaushal
E14621
Associate Professor
CSE(AIT)

DISCOVER . LEARN . EMPOWER

3. Diagnostic Analytics

- Analytics performed on the internal data **to understand the "why" behind what happened is referred to as diagnostic analytics**.

- This kind of analytics is used by businesses **to get an in-depth insight into a given problem,** provided they have enough data at their disposal.

- Diagnostic analytics helps **identify anomalies** and **determine casual relationships in data**.

- **For example,** eCommerce giants like **Amazon** can drill the sales and gross profit down to various product categories like Amazon Echo to find out why they missed on their overall profit margins.

- Diagnostic analytics also find **applications in healthcare** for identifying the influence of medications on a specific patient segment with other filters like diagnoses and prescribed medication.

4. Prescriptive Analytics

- Prescriptive analytics is the next step of predictive analytics that adds the spice of manipulating the future.

- Prescriptive analytics advises on possible outcomes and results in actions that are likely to maximize key business metrics.

- It basically uses simulation and optimization to ask "What should a business do?"

- Prescriptive analytics is an advanced analytics concept based on –

  - Optimization that helps achieve the best outcomes.

  - Stochastic optimization helps understand how to achieve the best outcome and identify data uncertainties to make better decisions.

Prescriptive Analytics

Prescriptive Analytics
Simulation and Optimization

Prescriptive analytics is an advanced analytics concept based on –

Optimization that helps achieve the best outcomes.

Stochastic optimization that helps understand how to achieve the best outcome and identify data uncertainties to make better decisions.

Used in producing the credit score which helps financial institutions decide the probability of a customer paying credit bills on time.

Aurora Health Care system saved $6 million annually by using prescriptive analysis to reduce readmission rates by 10%.

Image Source: https://www.projectpro.io/article/types-of-analytics-descriptive-predictive-prescriptive-analytics/209

4

Prescriptive Analytics

- Prescriptive analytics is a **combination of data and various business rules**.

- The data for prescriptive analytics can be both **internal** (within the organization) and **external** (like social media data).

- Business rules are **preferences, best practices, boundaries, and other constraints**.

- Mathematical models include **natural language processing, machine learning, statistics, operations research**, etc.

Application of statistical techniques

- Statistics eradicate **unwanted information and catalogs** the useful data in an effortless way making the humongous task of organizing inputs seem so useless and peaceful.

- Some ways in which Statistics helps in Data Science are:

Prediction and Classification:

Statistics help in prediction and classification of data whether **it would be right for the clients viewing by their previous usage of data**.

Application of statistical techniques

Helps to create Probability Distribution and Estimation:

• Probability Distribution and Estimation are crucial in **understanding the basics of machine learning and algorithms like logistic regressions.**

• Cross-validation and LOOCV techniques are also inherently statistical tools that have been brought into the Machine Learning and Data Analytics world for inference-based research, A/B and hypothesis testing.
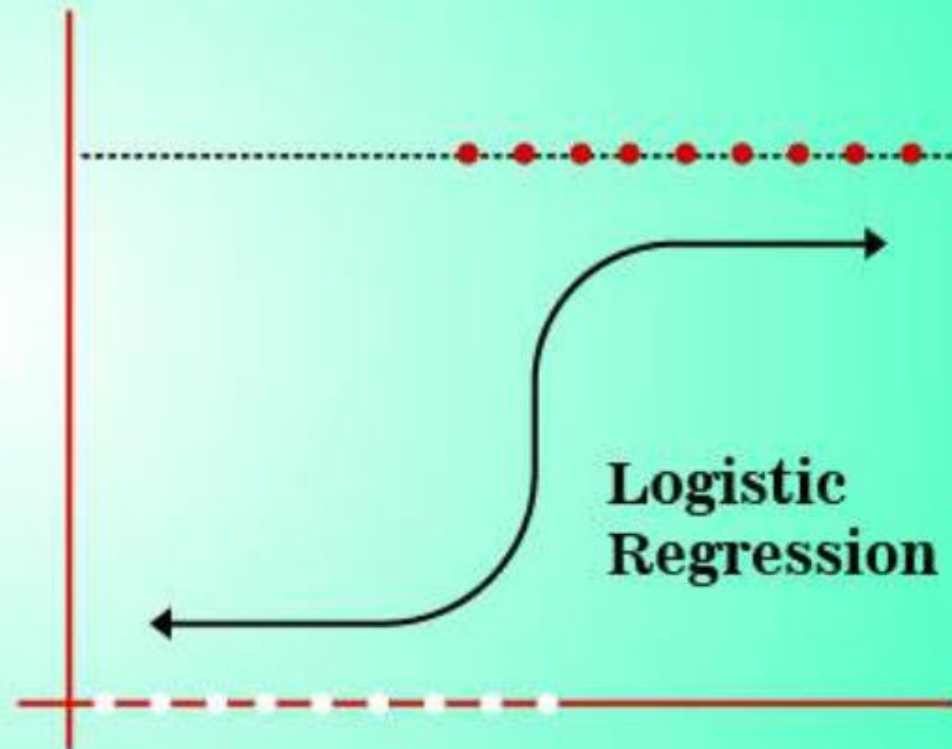
(*Cross-validation is a resampling method that uses different portions of the data to test and train a model on different iterations.*)

(*The Leave-One-Out Cross-Validation, or LOOCV, the procedure is used to estimate the performance of machine learning algorithms when they are used to make predictions on data not used to train the model.*)
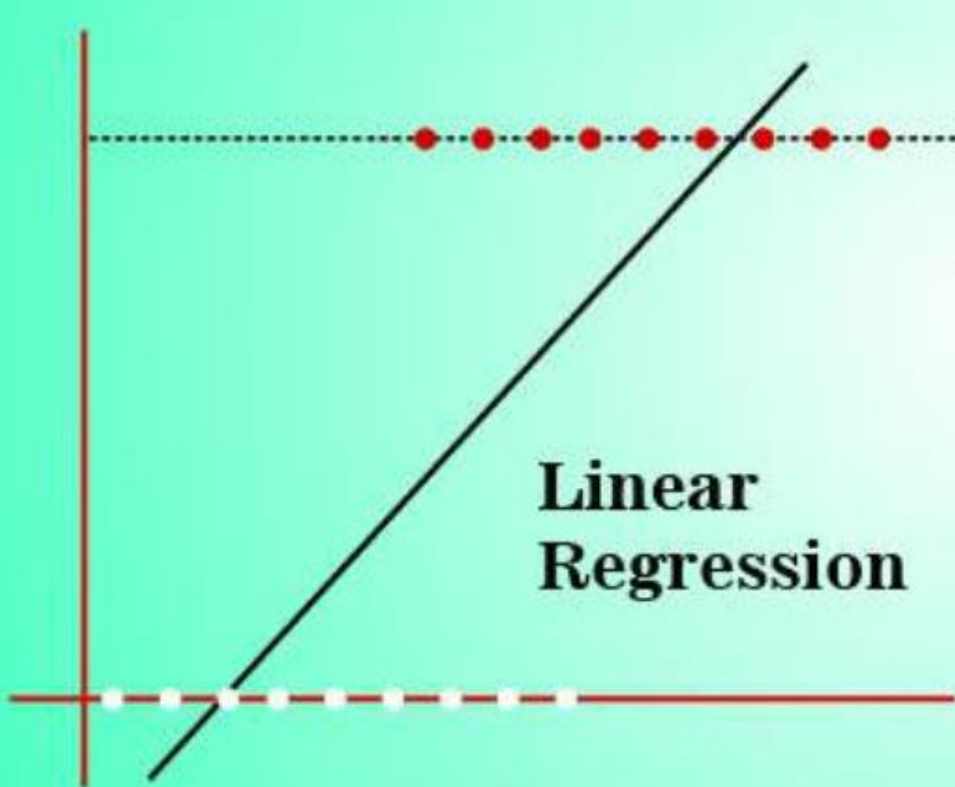
Linear regression and logistic regression both are machine learning algorithms that are part of supervised learning models. Since both are part of a supervised model so they make use of labeled data for making predictions.

Linear regression is used for regression or to predict continuous values whereas [logistic regression](#) can be used both in classification and regression problems but it is widely used as a classification algorithm. Regression models aim to project value based on independent features.

The main difference that makes both different from each other is when the dependent variables are binary logistic regression is considered and when dependent variables are continuous then linear regression is used.

Application of statistical techniques

Pattern Detection and Grouping:

Statistics help in **picking out the optimal data and weeding out the unnecessary dump of data** for companies who like their work organized. It also helps spot anomalies which further helps in processing the right data.

Powerful Insights:

Dashboards, charts, reports and other data visualizations types in the form of **interactive and effective representations** give much more powerful insights than plain data and it also makes the data **more readable and interesting**.

Application of statistical techniques

Segmentation and Optimization:

It also segments the data according to different kind**s of demographic or psychographic factors** that affect its processing. It also optimizes data in accordance with minimizing risk and maximizing outputs.

Homework

- List out the various prescriptive models.
- How prescriptive analysis is helping in generating an optimized model?

References

- **Text Books:**
  - Principles of Data Science by Sinan Ozdemir, (2016) PACKT.
  - Data Science from Scratch: First Principles with Python 1st Edition by Joel Grus
  - https://www.projectpro.io/article/types-of-analytics-descriptive-predictive-prescriptive-analytics/209
  - https://www.analyticssteps.com/blogs/importance-statistics-data-science
- **Reference Books:**
  - R1. Data Science For Dummies by Lillian Pierson (2015)
- **Journals:**
  - http://www.ijsmsjournal.org/ijsms-v4i4p137.html
  - https://mail.premierpublishers.org/ijsm/051120195187

Thank you

Please Send Your Queries on:

e-Mail: jitender.e14621@cumail.in