Project Topic

Drone Delivery for Retail: Assessing, Analyzing, and Predicting Model

Drone Background

E-Commerce shopping such as ordering food, buying stuff, grocery runs or shipping packages, the consumer space is increasingly relying on fast and reliable doorstep delivery. A delivery drone is an Unmanned Aerial Vehicle (UAV) used to transport packages, food or other goods. Today, operators are working hard to make them a reality for tomorrow's deliveries. Drones could allow accelerated delivery times, improved accuracy and reduce human cost associated with delivery. The volume of package delivery drones is projected to grow from 32.5 thousand (in units) in 2024 to 275.7 thousand (in units) by 2030 (www.marketsandmarkets.com)

https://corporate.walmart.com/

Another method of retail delivery is DoorDash:https://www.doordash.com. DoorDash is a food delivery and ordering service that connects customers with local restaurants. It's the largest food delivery platform in the United States. Dashers can use a variety of transportation methods, including drones, cars, bikes, scooters, and motorcycles.

Project Description

This research program is designed to introduce high school students to the fundamentals of data science, visualization, and data analytics and predicting models approaches. Over six weeks, students will explore in-depth understanding techniques of data visualization, analysis, and modeling. Students will start from question formulation through data gathering, data processing, and decision making. Students will explore data handling, fundamentals scripting in python and building regression modelling. Students also will utilize Excel or CODAP (Common Online Data Analysis Platform) or Tableau to quickly create data visualization with interactive dashboards to gain insights, show trends, and tell stories for real-world capstone projects. The program will culminate in a comprehensive research project where students will develop a data model for a hypothetical or real business, supported by their analysis of drone delivery. The overall goal of the project is to predict the drone delivery for retail.

Prerequisites

- **Grade Level:** 10th grade and above.
- **Interest:** Must have a keen interest in data science analysis and visualization.
- **Skills:** Basic understanding of data and basic statistics such as: mean, median, mode, and Python skills.
- **Technology:** Access to a computer with internet connection, and basic coding skills.

Project Outcomes

By the end of the program, students will be able to:

1. **Review Data Analytics Fundamentals**: Gain knowledge of different types of data analytics methods.
2. **Use AI Tools:** Understand data research and leverage AI tools and ChatGPT.
3. **Conduct Descriptive Analytics Research**: Learn to gather and process data to perform quantitative research and descriptive and diagnostic analytics using various tools.
4. **Explore and Visualize Data**: Use CODAP or Tableau or Excel or Python graphic pipeline libraries.
5. **Develop Predictive Model**: Create regression model and validate accuracy of the model.
6. **Enhance Research Skills:** Develop essential research skills, including data collection, analysis, and interpretation.
7. **Improve Communication Skills:** Enhance written and oral communication skills through the presentation of their research findings.
8. **Gain Practical Experience**: Obtain hands-on experience with Data Analytics tools and Team capstone projects.

Program Structure (Tentative Schedule)

- **Week 1:** Introduction to identify the problem related to Drone Package Research
  - Overview of drone package delivery market
  - Assessing by type, range, package size, duration, operation Mode
  - Literature one Case studies of successful Drone Delivery for Retail
  - Gathering Data and Perform Analysis
  - Hands-on practice with data analytics tools (e.g., Excel, Python)

- **Week 2:** Process Data
  - Understanding data processing and cleansing
  - Introduction to AI tools and ChatGPT
  - Reading data using python (Python, Jupyter Notebook, Pandas, NumPy, Seaborn, Matplotlib, Scipy, Statsmodels, Scikit-learn)
  - Overview CODAP or Tableau
  - Creating Scatter Plots, Small Multiples, and Trend Lines

- **Week 3:** Consider Models
  - Developing a regression model
  - Train and test the model
  - Valid model score and performance of measures

- **Week 4:** Project Development and Presentation (Tell your Story)
  - Finalizing the Drone model and research report
  - Presentation of projects and peer review
  - Feedback and refinement of final deliverables

Deliverables

- **Research Report:** A detailed report on the chosen topic, including problem statement research, background, data sources, methodology, data analysis and modeling, and findings.
- **Drone Delivery for Retail Proposal:** A comprehensive study plan for a hypothetical or real business from identifying the problem to predict the model.
- **Presentation:** A PowerPoint presentation summarizing the research project and sharing the story.

This structured program aims to provide students with a comprehensive understanding of data analytics and predicting models to equip them with the skills needed for future academic and professional pursuits in data science fields.

References:

https://codap.concord.org/

https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/future-air-mobility-blog/commercial-drone-deliveries-are-demonstrating-continued-momentum-in-2023

https://www.mordorintelligence.com/industry-reports/delivery-drones-market

https://www.emarketer.com/insights/drone-delivery-services/

https://market.us/report/drone-package-delivery-market/

https://maap.ictas.vt.edu/content/dam/maap_ictas_vt_edu/Perspectives-on-drone-delivery.pdf

https://www.statista.com/statistics/1302585/global-drone-delivery-service-market-size/

https://www.factmr.com/report/drone-delivery-services-market

https://www.marketsandmarkets.com/Market-Reports/drone-package-delivery-market-10580366.html

https://kilthub.cmu.edu/articles/dataset/Data_Collected_with_Package_Delivery_Quadcopter_Drone/12683453

https://www.thebusinessresearchcompany.com/report/delivery-drones-global-market-report

https://www.kaggle.com/code/piantic/drone-delivery-basic-eda-and-submission

https://about.doordash.com/en-us