Harvard College Data Analytics

Harvard Undergraduate Data Analytics Group

PREPARED FOR

CTT Correios de Portugal, S.A.

PREPARED DATE

September 27, 2023

ENGAGEMENT TIMEFRAME

January-May 2024

Harvard College Data Analytics Group (HDAG) is a non-profit student organization at Harvard dedicated to helping organizations make smarter and more data-driven decisions. We assist companies in achieving their strategic goals by translating their data into meaningful and actionable information. We aim to pair teams of well-trained, highly-motivated Harvard students with our partners, specifically focusing on associates and analysts in industries where they have experience or interest, in producing the highest quality of work possible. From data collection to strategy implementation, we want to be there every step of the way to help organizations make data their new superpower.

We competitively recruit undergraduate students at Harvard with demonstrated competence, dedication, and problem-solving skills, many of whom have prior experience working in top management consulting or data science teams. All our team leaders have experience working in or leading data science teams at Fortune 500 companies, and our board of technical advisors includes members of the Harvard faculty. Each team, composed of around seven to eight Harvard students, commits over 600 hours to a case over 10 weeks.

We enjoy different challenges and work with a diverse set of organizations and problems. Our clients range from local businesses to Fortune 500 companies to international non-profits. Using our capabilities in visualization, machine learning, and predictive analytics, among others, we help organizations diagnose problems and identify strategies across their sales, marketing, financial, or operational functions. Client confidentiality is our utmost priority.

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Proposal for CCT

Summary:
CTT - Correios de Portugal, the national postal service of Portugal, seeks a collaboration with HDAG to optimize its operational capabilities. Through a series of consultations, CTT has expressed an interest in utilizing predictive modeling to optimize and understand its operational/delivery capabilities. The broader objective is to integrate dynamic, data-driven strategies to improve service efficiency, ensure timely deliveries, and subsequently enhance customer satisfaction.

Dataset:

- Historical data (2022 and 2023 full year) on delivery capacity at various stations across Portugal and Spain.
    - Loop in external data about Amazon, spending in China, etc.
- Information on the number of vehicles, personnel, volume of parcels handled, space, weight, etc., at each delivery point.
- Data from the Mobi mobile application detailing the start and end time of routes, break durations, and delivery coordinates.
- Any additional data on the resources required to handle the parcels.

Tasks:

- Predictive Modeling: Develop a predictive model that, based on the current input of vehicles, personnel, and other resources, can forecast the maximum delivery volumes for any given point/warehouse.
    - Evaluate feature importance to discern which resources significantly influence volumes.
    - Create scenarios to determine bottlenecks and solutions for both urban and rural delivery points.
- Capacity Visualization: Compare current resource utilization vs. theoretical capacity to visualize the distribution of system utilization and available capacity in different areas.
- Operational Dashboard: Design a dynamic dashboard that can provide real-time insights into delivery capacity, current resource utilization, and potential bottlenecks.

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Deliverables:

- The above predictions and results in CSV form, and visualized in day-by-day graphs. Source code to reuse and customize the model in the future.

Main Contact:

João Alves (joao.h.alves@ctt.pt)

Engagement Timeline

Dates	Week	Tentative Schedule
1/29-2/2	0	Mohan and João will be in contact to finalize work expectations and project details and to obtain the dataset
2/5-2/9	1	The HDAG Case Team Leader (CTL) will have a call with the CCT team to meet the team, better understand work expectations, and align goals for this semester (in terms of research questions, final format of deliverables, etc.) After the meeting, CTL will map out the weekly work plan for the semester: from both the perspective of technical execution and business analysis.
2/12-2/16	2	CTL will introduce the project and the work plan to the rest of the case team and start delegating tasks to each individual. (In each team we have data scientists who are proficient in Python, R, SQL, and other analytical tools as well as business analysts who have experience working in the industry).
2/26-3/1	3	Every member of the case team will follow the work plan, and start the data analytics, which includes every aspect of the data pipeline: data transferring, cleaning, exploration,
3/4-3/8	4	

3/11-3/15	5	modeling, visualization, etc. Every week, each CTL will update the client liaison on the progress the case team has made over the past week. There is also a weekly meeting between the case team where each member will discuss their work with the others, and the CTL will delegate work for next week.
3/18-3/22	6	Wrap up the work for the first half of the semester, and prepare for the midway presentation to CCT which can include a technical product (algorithm, statistical model, web app) and a business presentation (slides).
3/25-3/29	7	Midway presentations with CCT: Each team will present their findings and recommendations from the first half of the semester to the client team. Each HDAG case team will follow up with any questions the CCT team might have during or after the presentation.
4/1-4/5	8	After the midway presentations, the CTL will integrate comments or suggestions from the client team into the work plan. Each CTL will list out the remaining questions or technical tasks for the latter half of the semester and delegate them to each individual on the case team.
4/8-4/12	9	
4/15-4/19	10	
4/22-4/26	11	The case team will summarize their work for the entire semester and give a final presentation to the client. This will include both technical deliverables and the business presentation. HDAG team will follow up with any questions the client business team might have during or after the presentation.
4/29+	Post-	HDAG team will follow up with CCT on the implementation

	Project	of suggestions and deployment of analytical tools. We will ask for feedback on their work for the Spring of 2024.

Pricing

- Engagement Timeline: 12 weeks, January - May, 2024
- Semester Case Fee: $10,000