



# Harvard Undergraduate Data Analytics Group

PREPARED FOR

PREPARED DATE

**Invitae**

Aug 1, 2022

ENGAGEMENT TIMEFRAME

Sep - Dec 2022

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 associates and analysts in industries where they have experience or interest, in order to produce 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 include members of the Harvard faculty. Each team, composed of around seven to eight Harvard students, commits over 600 hours to a case over the course of a 10-12 week span.

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.

# Team Capabilities

## **1. Data Analytics Consulting: deriving valuable insights from data**

- a. Case study 1 - Providing IT resource management analytics for a multinational Fortune 500 company in energy and automation: Through statistical analysis of over 100k anonymized employees, we identified help desk call volume and demographic trends to help inform executive decisions on employee satisfaction and IT resource allocation.
- b. Case study 2 - Providing data processing service for a Wall Street fintech company: Through scraping the Securities and Exchange Commission (SEC) website and extracting relevant data en masse, we created well-formatted databases to advance the client's core digital offerings.

## **2. Machine Learning Algorithms: training and deploying predictive models**

- a. Case study 1 - Providing IT security service for a multinational Fortune 500 company in energy and automation: By building ML models, we enabled predictive analytics for the company's future spending on Indirect Procurements and introduced data integrity improvement design to the purchase request process.
- b. Case study 2 - Providing AI algorithm advancements for a leading sports analytics company: Using “Big 5” European club leagues’ pre-game and in-game data, we created models that predict win, loss, and draw probability and provided an evaluation of the accuracy and probability calibration of the models.

## **3. Business Intelligence Visualizations: creating interactive visual dashboards**

- a. Case study: Providing visualization services for the World Health Organization Region for the Americas: We developed a web app to visualize models on COVID-19 outbreak to predict rate of transmission and epidemic curves; product delivered to WHO country offices in Latin America for projections of varying health intervention measures.

## **4. Whole-Set Solutions: providing comprehensive digitalization systems**

- a. Case study: Creating an HR and user management system for an educational foundation in China: We developed a system from scratch to help the management team keep track of employee's progress and KPI and to help employees better manage student feedback.

## Proposal for Invitae:

The goal of this project is to work with Invitae's dataset on claims from the billings and reimbursements team in order to identify and communicate the anomalies that occur when claims are filed. Broadly, the project HDAG will engage with Invitae would consist of three main stages.

- 1) The HDAG team will first consolidate and clean claims data as needed, ensuring visibility into per-payer, per-product reimbursement performance.
- 2) After this is done, the HDAG team will develop algorithms that will highlight anomalies in how payers are reimbursing the services Invitae provides.
- 3) Once the anomaly detection algorithm is finalized, a system will be implemented to highlight these changes to the appropriate leaders in the organization.

At the end of the engagement, the HDAG team will deliver the following:

- 1) A dataset that is both cleaned and consolidated for future use by Invitae.
- 2) A collection of models that are able to detect anomalies in how reimbursements are fulfilled. All code will be provided to and owned by Invitae.
- 3) Slide decks detailing the efficacy of each of the detection models as well as comparisons across the different models along with the system developed to highlight these anomalies to the appropriate leaders.

## Rough Engagement Timeline

| Dates       | Week | Tentative Schedule   |
|-------------|------|--|
| 9.5-9.18    | 0    | <p>Each HDAG Case Team Leader (CTL) will have a call with the respective Client liaison to better understand work expectations and align goals for this semester (in terms of research questions, final format of deliverables, etc.)</p> <p>After the meeting, CTL will consult with the 1-2 associates of the HDAG case team and map out a more detailed weekly work plan for the semester: from both the perspective of technical execution and business analysis.</p>  |
| 9.19-9.25   | 1    | <p>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). By the end of Week 3, the dataset on claims data should be cleaned and consolidated. Additionally, exploratory data analysis will have started along with research into potential models that can be used for anomaly detection.</p>   |
| 9.26-10.2   | 2    |  |
| 10.3-10.9   | 3    |  |
| 10.10-10.16 | 4    | <p>Every member of each Client Case Team will follow the work plan, initially starting with implementing a simpler anomaly detection model based on the dataset. In parallel, exploratory data analysis will be done by the team to further derive insights into the provided dataset on claims. The main focus will be on finalizing a model that is able to reach an acceptable accuracy.</p> <p>Every week, each CTL will update the Client liaison on the progress that 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,</p> |
| 10.17-10.23 | 5    |  |

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|              |    | <p>and the CTL will delegate work for next week.</p> <p>By the end of Week 5, exploratory data analysis will have been finished and at least one simple model that is able to detect anomalies in the billing data will be finished. Additionally, the concepts behind different models for anomaly detection will have been discussed and begun to be implemented by the case team.</p>  |
| 10.24-10.30  | 6  | Midway presentations with Client: each whole 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 Client team might have during or after the presentation.  |
| 10.31-11.6   | 7  | <p>After the midway presentations, each CTL will integrate comments or suggestions from the Client team to 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 of the case team.</p> <p>Additional anomaly detection models will begin to be developed by the case team in order to provide comparisons between which may be best to use. In parallel, the case team will be exploring how to develop a system that highlights the detected anomalies to the necessary individuals within the organization.</p> |
| 11.7-11.13   | 8  |   |
| 11.14-11.20  | 9  |   |
| 11.21-11.27  | 10 | <p>The case team will summarize their work for the entire semester and give a final presentation to Client. This will include both technical deliverables (e.g. code repository, curated data sets) and the business presentation (e.g. anomaly detection model summaries). The HDAG team will follow up with any questions the Client business team might</p>  |
| 11.28 - 12.4 | 11 |   |

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|------------|--------------|--|
|            |              | have during or after the presentation.   |
| 12.5-12.11 | Post-Project | The HDAG team will follow up with Client on the implementation of suggestions and deployment of analytical tools. We will ask for feedback on their work for the Fall of 2022. This extra week is a time that is mainly kept in the case of any delays in finishing deliverables when final presentations can still occur. |

## Pricing

- Engagement Timeline: 12 weeks, September - December, 2022
- Semester Case Fee: \$40,000