Predicting Academic Results with Azure Machine Learning

Mantel group

The
Highlights

1

Developed a predictive model using Azure Machine Learning to identify students at risk of academic failure.

2

Using the CatBoost model, the university could predict students who required academic assistance with 93% accuracy.

3

The model is course-agnostic, meaning it can be applied across all courses at the university.

The
Problem

A large Australian university wanted to better understand which students were at risk of academic failure.

They sought a more holistic approach to help students reach their academic potential. However, the university lacked a predictive model that could identify these students. The challenge was not just to create a predictive model, but to ensure that it was course-agnostic and could be used in perpetuity.
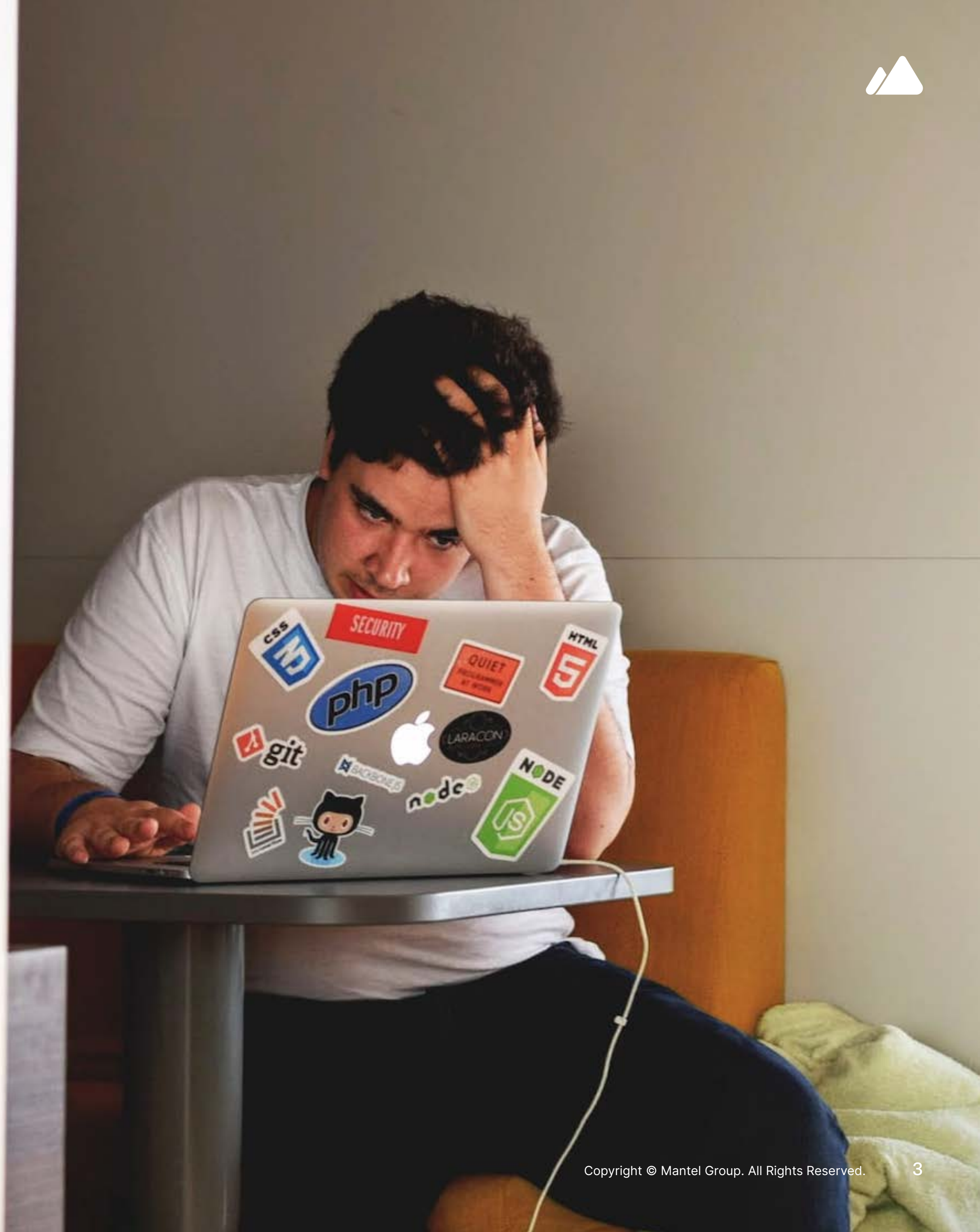
The
Opportunity

Along with the opportunity to accurately identify students at risk of academic failure, the university could draw from Mantel Group's engineering expertise to upskill their data team.

This would not only help the university provide better support to these students, but also enhance the university's ability to engage in future machine learning initiatives, many of which could be driven independently with their strengthened internal engineering capabilities.

The
Solution

Mantel Group collaborated with the university and Microsoft to conduct a data science proof of concept (POC).

The POC used predictive modelling in Azure ML to identify student characteristics that are closely related to academic failure. The data was sourced from three main systems and prepared using Azure Synapse.

The data included observations from ten first-year courses across different faculties and a variety of factors that may affect academic performance. Azure Machine Learning was used to test and rank model performance, allowing data scientists to choose the best model.

The benefits of this solution were as follows:

- ✓ **The predictive model achieved an exceptionally high performance level, with an accuracy of 0.93 and a recall of 0.80.**

- ✓ **The model is course-agnostic, meaning it can be applied across all courses at the university.**

- ✓ **The model helped the university better understand which elements impact the failure rate of students.**

- ✓ **The solution is housed within the university's own platform, and Mantel Group upskilled some of their internal staff to enable this model to be used not only within that department but also more widely across the university.**

As a result, the subscription program's new brand and associated benefits were successfully established in a frictionless and intentional manner, effectively encouraging users to sign up without compromising the current user experience of each individual retail brand.

Our
Approach

The project began with a business and data discovery phase, where Mantel Group took a deep dive into what outcomes the university's team wanted to gain from the POC. This included going through vision statement mapping and identifying what tangible outputs were required. A Data Discovery Workshop was then conducted to dive deeper into the data and document what data sources were available.

Various activities were undertaken as part of the Exploratory Data Analysis (EDA) on both categorical and numerical variables. This information, together with the outcomes from the feature importance analysis, was used as input for the predictive modelling. The model deployment was implemented with Azure MLOps, which manages and automates the whole machine learning lifecycle.

The data was prepared using Azure Synapse and contained observations from ten first-year courses, across different faculties. The anonymised data included observations of previous academic performance and the many factors that may affect it. Azure Machine Learning was used to test and rank model performance, allowing data scientists to choose the best model.

The challenge was to develop a model that could be applied to any type of course at the university. **Feature engineering made it possible to create input variables (features) that are course agnostic,** instead of having input variables that are specific for each course.

- Digital strategy services to the new greenfields organisation which established best technology, design and operating practices;
- End-to-end design thinking.
- Collaboration and regular alignment with multiple retail brands on core experience and journeys.
- Product engineering discovery review and advisory service.
- Embedded Agile Delivery services.
- Hybrid sessions for design and development.
- Regular feedback sessions.
- Hybrid workshops focused on business alignment and customer vision.
- A design system for the business.

Reach out today

We're always keen to start new conversations on using technology to impact people in a positive way.

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