Course Level Analysis Result

Course: PSY_X

Prediction on Term: 202209

- **Part 1: Course-Level Analysis & Performance in Training Set**
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Part 1: Course-Level Analysis & Performance in Training Set

This project aims to use academic records provided by the CIO (Chief Information Office) and the assessment grades before week 7 provided by the course lecturer(s) to develop predictive models of students' academic performance in each target Course at the University. (About LASSO Regression Model: 1.1. Linear Models — scikit-learn 1.1.2 documentation)

Objective: To develop a predictive model for the early identification of students at academic risk (Course GPA <2.33) within the Course.

Model Performance on Training Dataset:

- For Grade Prediction: Robust R^2 value of 0.72, MSE (mean square error) = 0.19
- For Classification: No missed detections, successfully identifying all nine at-risk students in the training set (See Figure 1 Below).

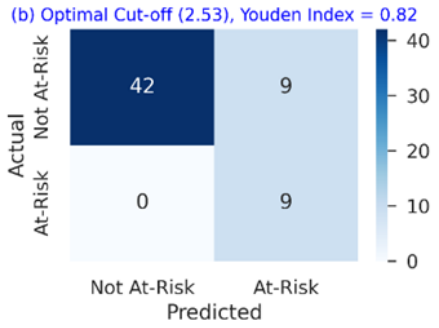

Fig 1. Confusion matrix for model performance in training set

Part 2: Analysis Results on 202209 (with the Youden Index Tunned Cut-Off)

Course code	PSY_X
Prediction Target	Course Grade
Total No. of Students	30
Youden Index Tunned Cut-Off	2.53
Predicted No. of At-Risk Students	8

Table 1. Descriptive Statistics of Testing Dataset (Feature Name Explanation see Appendix Table 2)

Statistics of Numerical Features

	TGPA.Prev	CGPA.Prev	Scholarship.Prev	Mdl_ts	Midterm Quiz
Mean	2.87	3.09	0.10	3.21	60.83
Min	0.68	1.23	0.00	0.00	13.00
Max	2.88	3.55	2.00	9.00	97.00
Std	0.78	0.44	0.32	3.01	9.67

Ratios of Categorical Features

Gender = Male	Local =1	SenYrEntr = 1	Hostel.Curr = 1
37%	81%	51%	46%

At-Risk Students (Prediction Grades with Student ID) – In Another Excel file: [course_code]_202209_pred_result.xlsx

Part 3: Model Interpretability - Key Predictors for Course GPA

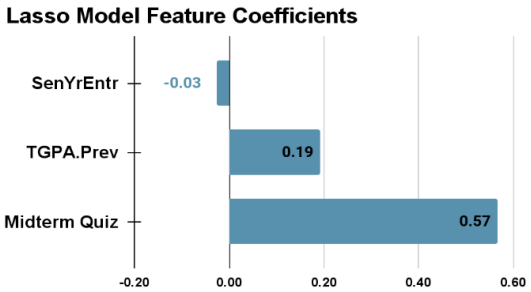

Fig 2. Key Predictors for Course GPA

The larger the coefficient (the more extended the bar), the more impact this indicator will play in course grade prediction.

- **Midterm Quiz:** With a positive coefficient of 0.57, it is the most important predictor of the course GPA. A one-point increase in the midterm quiz score corresponds to an average GPA increase of 0.57 points.
- **TGPA.Prev:** It is the second most influential predictor with a positive coefficient of 0.19. A one-point increase in the previous term's GPA results in a 0.19-point increase in the course GPA.
- **SenYrEntr:** With a negative coefficient of -0.03, senior-year entry students (SenYrEntr = 1) have, on average, a course GPA that is 0.03 points lower than first-year entry students (SenYrEntr = 0

Part 4: Interventions & Feedback

This section deals with interventions implemented after the model identified at-risk students. Please provide us with information about interventions that help improve the academic performance of at-risk students. For reference, our timeline for the intervention procedure that we have planned out is provided below. Figure 3.0 is the timeline for the intervention.

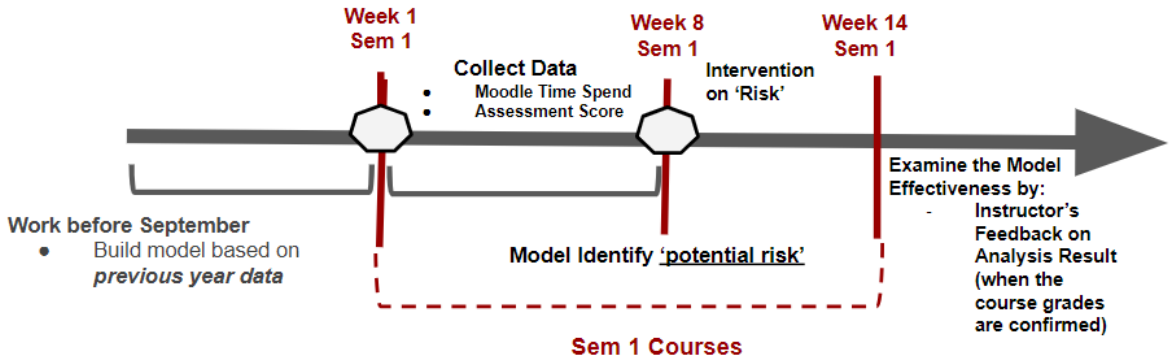

Fig 3: Intervention Timeline

4a. Which intervention strategies did you implement to provide students with targeted areas of academic support?

- ☐ Provide academic advising to individual students identified as potentially at-risk.
- ☐ Provide extra learning materials to at-risk students.
- ☐ Arrange for peer tutors or a TA for this course.
- ☐ Organize supplementary classes for this course.
- ☐ Other: _____

4b. Do you think the intervention can help the at-risk student?

4c. Do students score higher than the predicted scores after intervention?

4d. Please indicate your level of agreement with the following analysis results for this the analysis:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Result					
The list of At-Risk students **(in Excel)**	1	2	3	4	5
Main predictors for the course grade **(in part 3)**	1	2	3	4	5

Any comment on our result in 'The list of At-Risk students?

Any comment on our result in the Main predictors for the course grade?

Appendix: List of Features in Train/Test Dataset

Table 2. List of features in the training/testing dataset

Feature Name	Description	Data Type
SID	We masked student IDs to protect students' privacy.	Categorical
Term	The course term code representing the semester is formatted as YYYYMM	Categorical
TGPA.Prev	Student's previous term GPA indicating past performance	Numerical: Continuous
CGPA.Prev	Student's cumulative GPA before the current term measures overall achievement.	Numerical: Continuous
Gender	Categorizes students as Male or Female.	Categorical
Local	1= Local students; 0= Non-local students	Categorical
SenYrEntr	Senior year entry students status (1 if student joined in 3rd year after diploma, 0 otherwise).	Categorical
Hostel.Curr	1 for on-campus, 0 for off-campus residence.	Categorical
Scholarship.Prev	The total number of scholarships received before this course indicates past recognition.	Numerical: Discrete
Mdl_ts	We normalized cumulative time on Moodle in 10 quantiles measuring engagement.	Numerical: Discrete
Midterm Quiz	A midterm quiz for course psy_x (from 0 to 100)	Numerical: Continuous
Course GPA	*The Target variable for prediction ranges from 0 to 4.33*	*Numerical: Continuous*