

OPEN UNIVERSITY WINDMILL CONSULTING

Improving student pass/fail ratio for online university
using machine learning

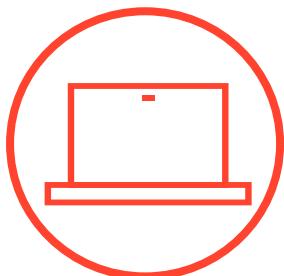
METHODOLOGY

IMPROVE STUDENT PASS /FAIL RATIO



Using the OU Analyze Open Dataset as input for machine learning algorithms^{*}:

- Student profile
- Grades halfway through the course
- Course material interactions (clicks)



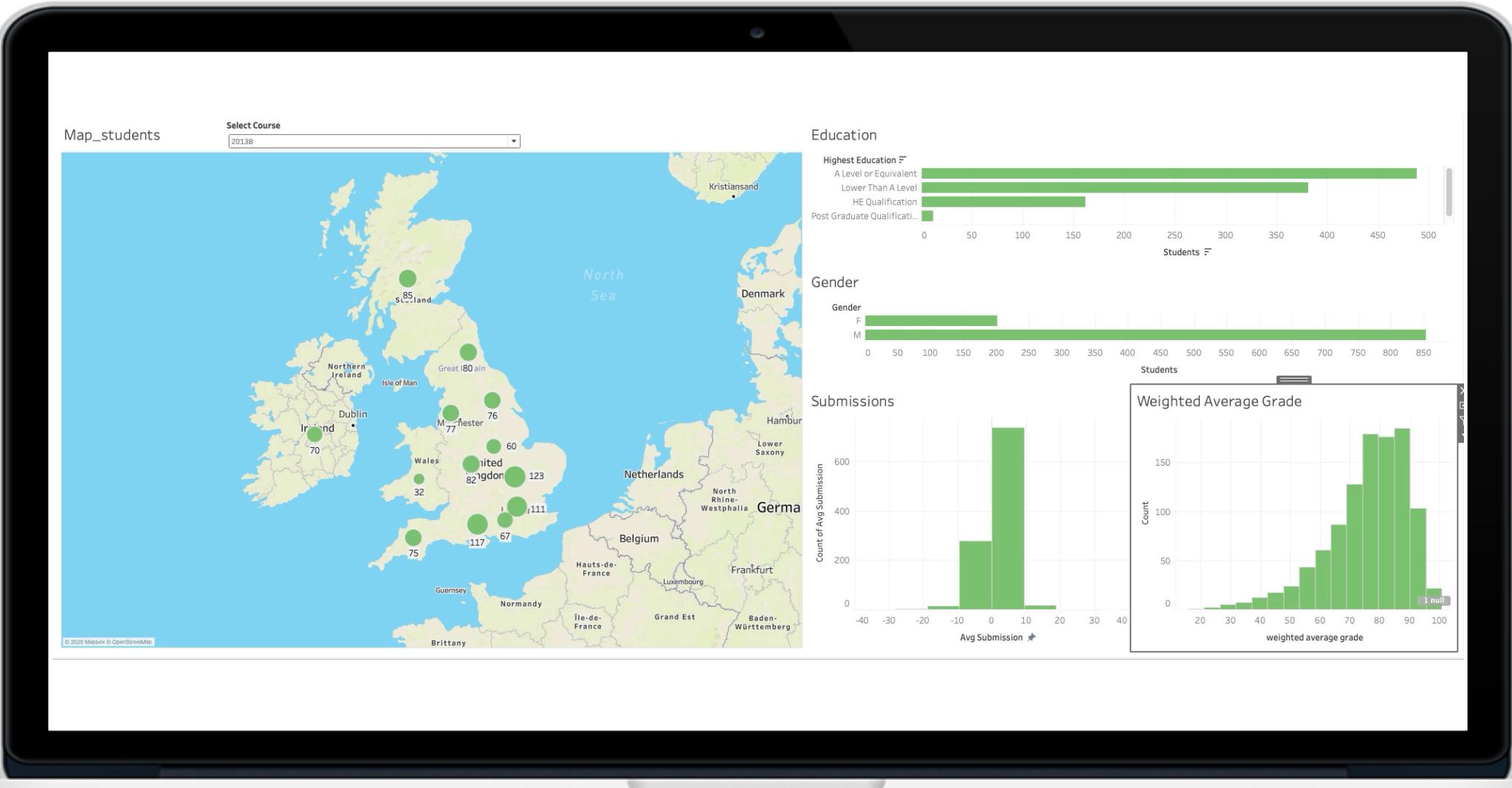
Developing interactive tools for teachers



Using insights to create appropriate interventions for students at risk of failing

INTERACTIVE TOOLS FOR TEACHERS

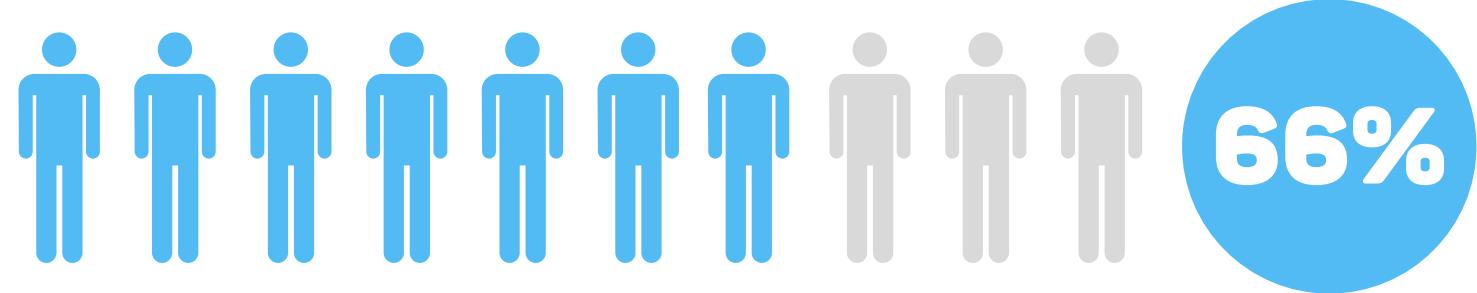
ALLOW TEACHERS TO MONITOR CLASS AND STUDENT PERFORMANCE



IDENTIFY STUDENTS AT RISK OF FAILING

USING MACHINE LEARNING ALGORITHMS

- Best performing model is an ensemble of logistic regression and random forest
- The model correctly identified 66% of students who failed the class
- F1 score of 0.62



- After running a permutation importance we can get some insight into the features that impact the pass / fail prediction
- The score for test 3 seems particularly impactful for this specific course

STUDENT PROFILE	GRADES	SUBMISSION	INTERACTIONS
Gender	Test 1	Average diff to deadline	Before class start
Education	Test 2		Before test 1
Wealth index	Test 3		Before test 2
Previous attempts	Weighted avg		Before test 3
Studied credits			
Disability			
Age band			

BENEFITS OF HIGHER PASS / FAIL RATIO

DIRECT IMPACT

- In our dataset 23% of students failed
- Assume interventions (e.g. tutoring) help half of those identified by the model pass
- Can save ~GBP 45,000 per year on external exam re-sits **for this single course** (OU offers hundreds of modules)

INDIRECT BENEFITS

- Reputational gain, improved rankings
- Ability to attract more students worldwide with **GBP 10-20K for fulltime student tuition** or **GBP 3K per individual module**

