Combining Canvas and Numbas to automate python coursework sign-offs

Ian M Davies

Department of Mathematics

Swansea University

i.m.davies@swansea.ac.uk

https://www.swansea.ac.uk/staff/science/maths/davies-i-m/

5th January 2021

Outcome

Given the likelihood of there being no face-to-face teaching I needed a secure method for students to register their completion of weekly python coursework where the subject area was computational probability. The python coursework required completion of highly structured Jupyter notebooks where the content was statistics and simulation pitched at Foundation/Level 3 students. In addition, there was the need to make the best use of remote/online python support sessions and thus move the coursework sign-off deadline away from the support session.

Situation (expected)

Canvas hosted course materials – short linked weekly presentations (PDFs & video), weekly toy exercises (by hand), weekly coursework (by python).

Highly structured Canvas (weekly) modules with comprehensive timeline guidance, for self paced study.

Teaching time constrained to; weekly review lecture on Friday, python support session on following Tuesday, and python coursework sign-off deadline on following Friday.

Choices (not many)

i) Fully randomized python coursework managed by central OKpy server. (we didn't have an OKpy server to hand)

ii) Semi-randomized python coursework with local data generation. (how do we handle visuals?)

iii) Micro viva-voce sign-offs via Zoom breakout rooms. (we wouldn't have the hours needed)

Epiphany – make use of suppressed outputs!

Actions (post epiphany)

i) Create a sign-off section utilizing tasks completed in the structured part of the python coursework, but requiring a few randomized input parameters.

ii) Automatically generate a collection of short arrays containing randomized input parameters and then append the few key answers by wrapping the sign-off section in a for loop (or loops).

iii) Employ a Numbas Exam to supply input parameters and check student answers, hosted on Canvas using the Numbas LTI, passing grades to Gradebook on completion.

Numbas need handle only about 20 arrays of length less than 8.

Review

We did have face-to-face python support for 75% of the class, with 25% studying online only. The changes introduced to handle remote study worked very well for that 25% and allowed for more in lab support. Introductory videos were available for the Jupyter Notebook, Numbas, and Canvas interactions.

i) Weekly Gradebook enquiries allowed checking of student engagement and progress – online only students were fine.

ii) Canvas activity reports provided additional engagement evidence.

iii) Student feedback (surveys) was very supportive of the provision.

There was remote access to lab PCs available, but most students, not just online only, used Anaconda Navigator locally.