
Machine Learning for Online Learning

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Online Learning



A substitute schoolteacher has found herself busier than ever helping support teachers design e-learning activities. Photo: AFP



Kaitlyn Yu Ching, a Form One student at HKUGA College, attends an online physical education class from her home in Tai Koo. Photo: Xiaomei Chen

For 12-year-old Kaitlyn Yu Ching, staying home for online learning over the past month did not make much difference from face-to-face lessons, as live-streamed classes were conducted following a strict timetable every week, even for physical education and music.



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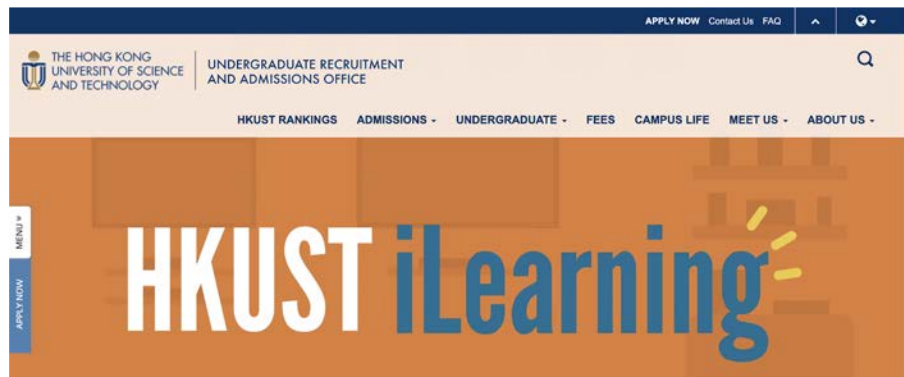
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Data Science and e-Learning Research Cluster

5 ITF projects funded by **Innovation and Technology Commission (ITC)** so far

2 are led by me to develop **personalized e-learning platforms** for both formal education (primary, secondary, and tertiary education sectors) and professional training



Learnlex Platform (hosted by Trumptech)

The image displays four overlapping screenshots of the Learnlex platform interface, which is designed for personalized learning in primary and secondary schools.

Leftmost Screenshot (Home Screen): Features the Learnlex logo at the top left. Below it, a large illustration of a smiling yellow character with a red bow tie is shown. Text at the bottom states: "Learnlex is a personalized learning platform. The education technology group offers an adaptive learning and recommendation through machine learning in primary and secondary schools."

Second Screenshot (Mission Selection): Shows a grid of mission cards. The top card is "Zone 1" with a "5-digit numbers" mission. Below it is "Zone 2" with a "Division (1 digit divisor)" mission. The bottom card is "Zone 3" with a "Mixed operations (1 digit addition and subtraction)" mission. A "Coming Soon" banner is visible at the bottom.

Third Screenshot (Question Details): Displays a "QUESTION" screen for a "5-digit numbers" mission. The title is "Big to small". The difficulty is "Numeric". The learning objectives are: "Develop an understanding of 5-digit numbers and recognise the place value 'ten thousands'." and "Recognise odd and even numbers." The screen shows "Attempts left: 0" and "Best Score: 100". A "Go!" button is at the bottom.

Rightmost Screenshot (Question Interface): Shows a "QUESTION" screen with a "5-digit numbers" mission. The title is "Big to small". The difficulty is "Numeric". The learning objectives are: "Develop an understanding of 5-digit numbers and recognise the place value 'ten thousands'." and "Recognise odd and even numbers." The screen shows "Attempts left: 0" and "Best Score: 100". A "Go!" button is at the bottom.

Sample Question

Math topics
(137)

Math topic-groups
(6)

The screenshot shows a game interface for a mission titled "Big to small". The interface is set against a space-themed background with a blue starry sky, a large red and blue planet, and a ringed planet in the distance. At the top, there's a navigation bar with "MAD" logo, a "Mission" button, a "QUESTION" button, and a user profile icon labeled "Qanalysis3". Below the navigation bar, there are three tabs: "Details", "Question", and "Solution". The "Details" tab is active, showing the mission title "Big to small" in a bold, italicized font. Below the title, the text "5-digit numbers" is highlighted with a red box. Underneath, the category "Numeric" is also highlighted with a red box. To the right of the category, there's a "Difficulty" indicator with four colored squares (orange, red, grey, grey). Below this, the "Learning Objectives" are listed: "Develop an understanding of 5-digit numbers and recognise the place value 'ten thousands'." and "Recognise odd and even numbers." At the bottom of the details panel, it shows "Attempts left 0" and "Best Score 100". A red "Go!" button is at the bottom of the panel. On the right side of the screen, there's a green leaf icon with the number "10" and a plus sign.

MAD < Mission QUESTION ? Home User Qanalysis3

Details Question Solution

Advanced

Big to small

5-digit numbers

①② Numeric

Difficulty

Learning Objectives :

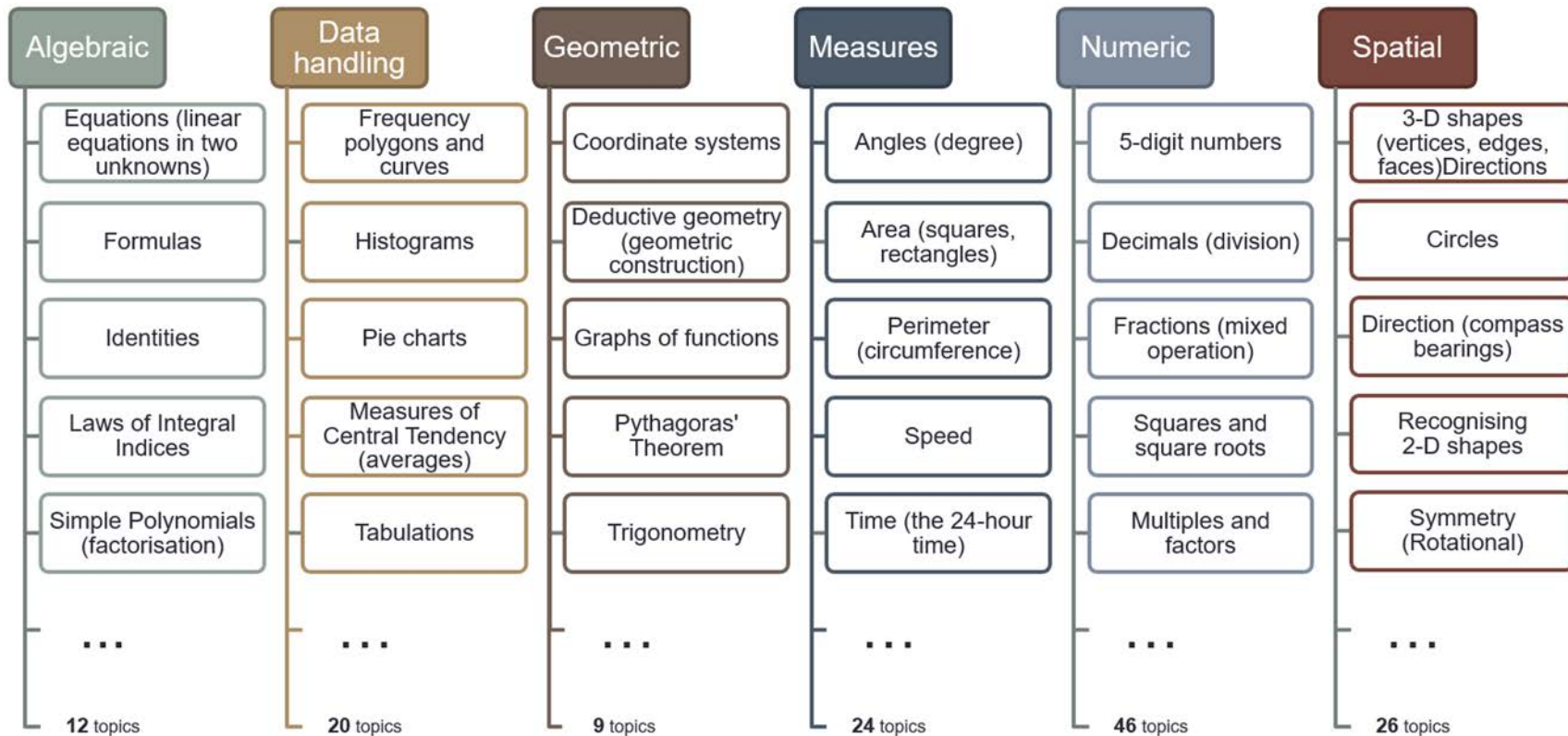
- Develop an understanding of 5-digit numbers and recognise the place value 'ten thousands'.
- Recognise odd and even numbers.

Attempts left 0 Best Score 100

Rewards Collected

Go!

137 Topics from 6 Groups



Attempt History of a Student



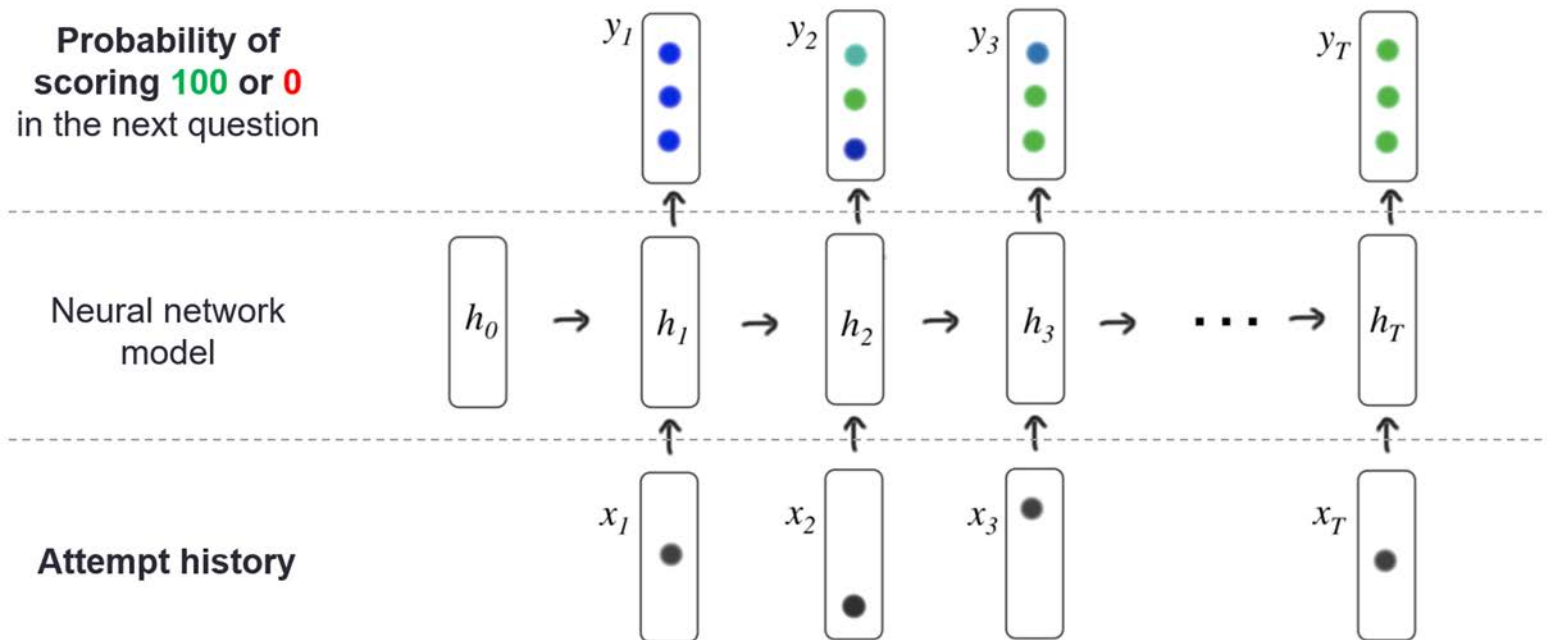
order	Question Id	Math topic-group	Math topic	Correct or Not	Time-stamp
1	13	Spatial	Recognising 2-D shapes	✓	19/03/13 08:34
2	41	Spatial	Spatial patterns	✗	19/03/13 08:35
3	15	Data handling	Histograms	✓	19/03/13 09:25
4	36	Spatial	Transformations	✓	19/03/13 10:16
5	108	Spatial	Fitting and dissecting 2-D shapes	✗	19/03/14 08:01
6	3324	Measures	Time (year, month, day, week)	✗	19/03/14 08:46
7	252	Algebraic	Equations (linear equations in two unknowns)	✗	19/03/15 02:09
8	239	Numeric	Squares and square roots	✓	19/03/26 10:17
9	3324	Measures	Time (year, month, day, week)	✓	19/04/24 06:47

Knowledge Tracing



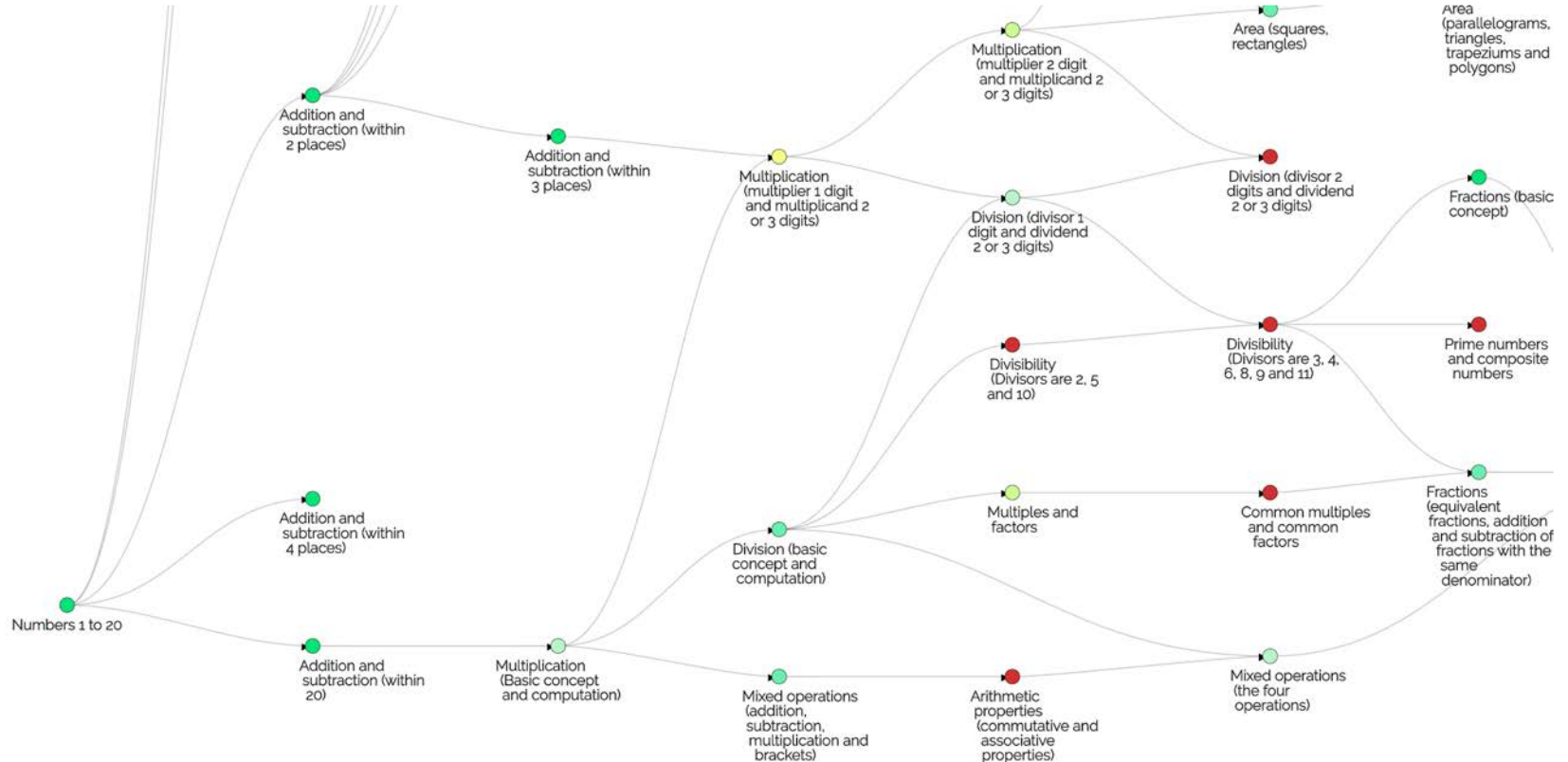
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8	239	Numeric	Squares and square roots	✓	19/03/26 10:17
9	3324	Measures	Time (year, month, day, week)	✓	19/04/24 06:47
10	40	Numeric	Decimals (mixed operation)	?	

Recurrent Neural Network for Knowledge Tracing

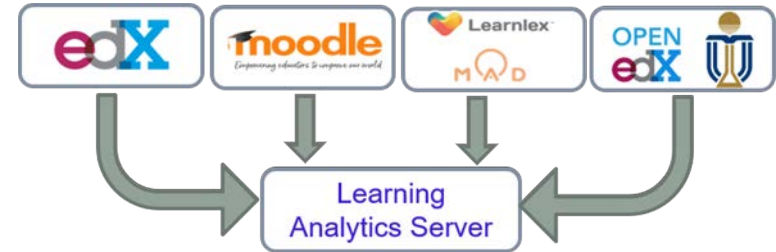
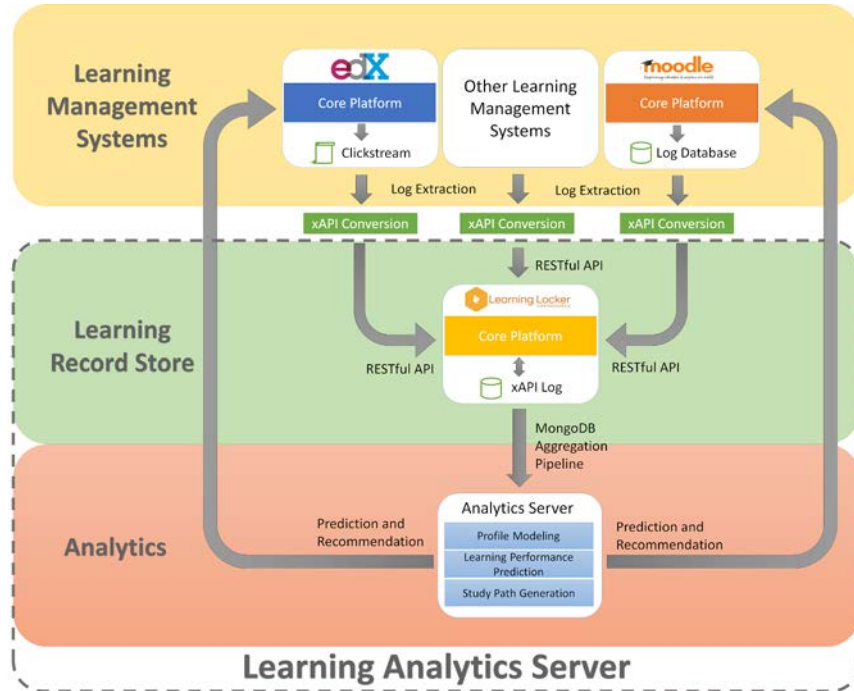


[Inspired by Deep Knowledge Tracing, C. Piech et al, NIPS 2015]

Question Recommendation based on Student Performance



Learning Analytics Server



Professional Training Courses on Open edX (collaboration with Cyberwisdom)



Please Join Pilot Launch





Q&A

