



# XAI for Course Design

Vinitra Swamy  
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- Age
- Gender
- Nationality
- Institution
- Role
- Teaching Experience
- MOOC Experience

## Background

Imagine you are the Professor of a programming flipped classroom course on Coursera.

Your flipped classroom course is offered by a Swiss university to **218 students** for **10 weeks**, with both **quizzes + videos**, culminating in a final exam.

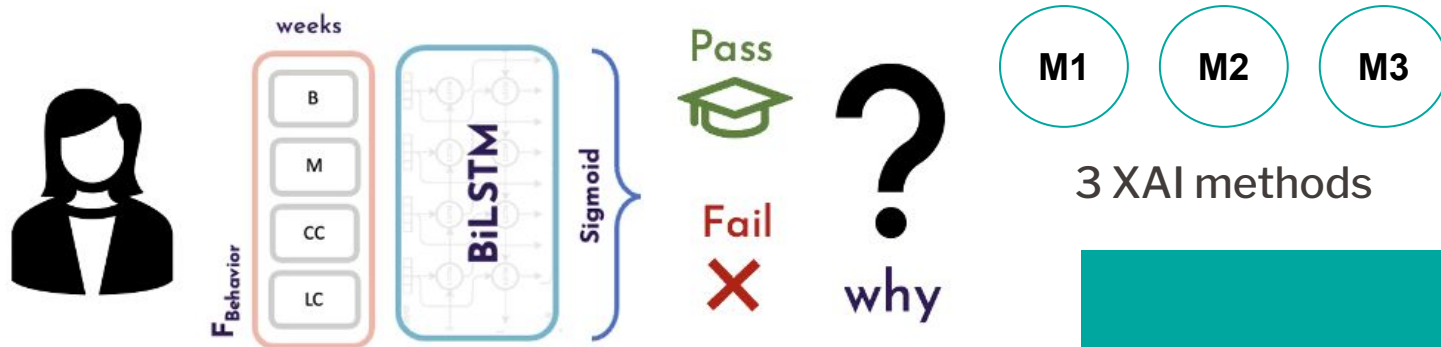
**Scenario**

Your professor friend has adapted your flipped classroom curriculum to a MOOC, with the same topics and materials.

Their MOOC course is offered by a Swiss university to 3564 students for 6 weeks, with both quizzes + videos, culminating in a final exam.

**Scenario  
cont.**

We train a model on student success prediction.



Goal: Use explanations extracted from this model to inform course design.

# Methods

# Example Features

**play-stop-play-vid:** The amount of times the student plays a video, stops, and plays.

**avg-len-ffw-vid:** The student's average seek length (s).

**num-submit-quiz:** The number of submissions performed for a quiz, on average.

**hourly-freq-regular:** the extent to which the hourly pattern of user's activities is repeating over days (e.g. the user is active at 8h-10h every day).

## Video

play-stop-play-vid

avg-len-ffw-vid

finish-watching-ratio-vid

speed-vid

active-participation-weekly-vid

freq-play-vid

## Quiz

num-submit-quiz

distinct-probs-quiz

correct-time-quiz

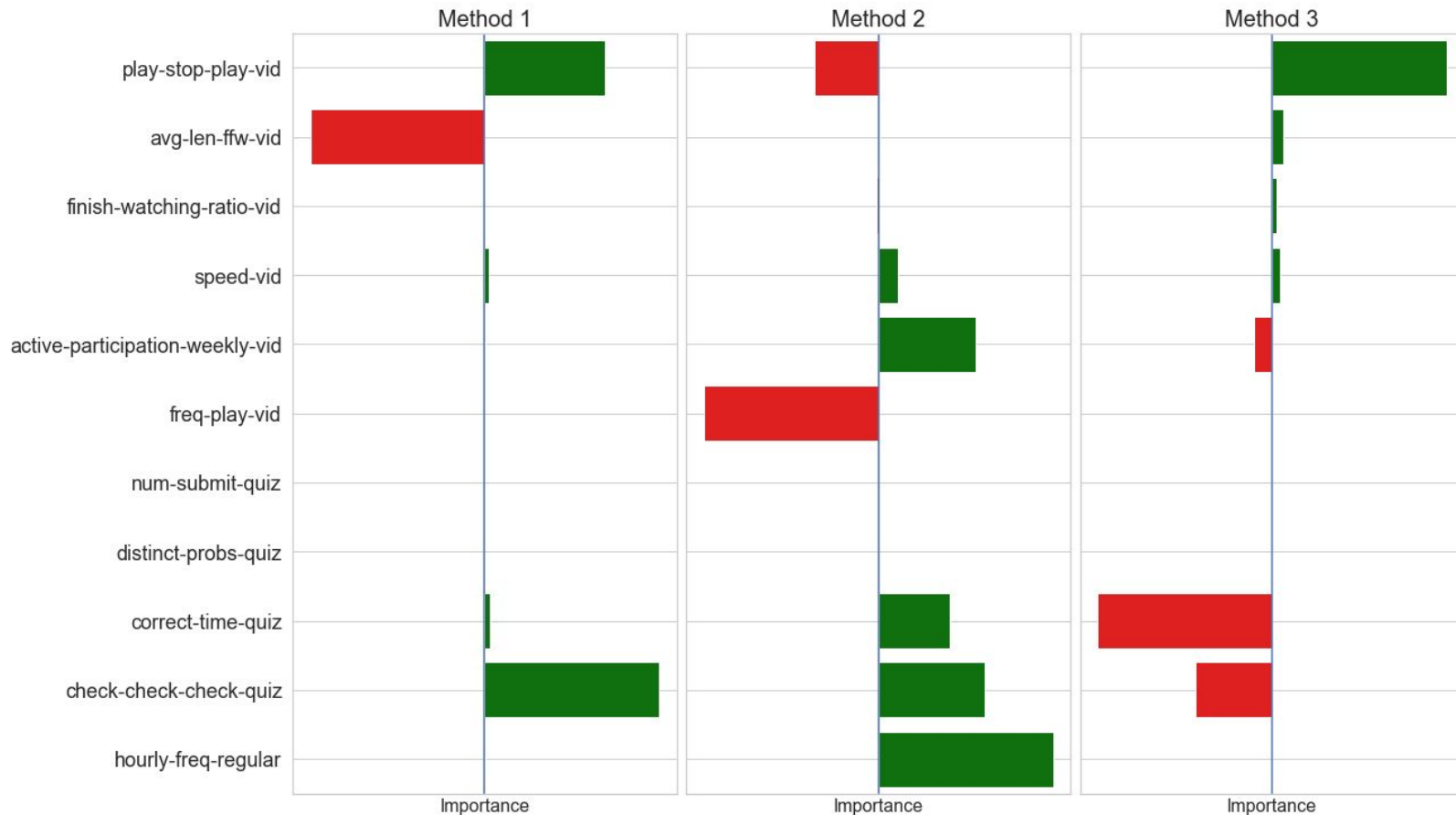
check-check-check-quiz

## Regularity

hourly-freq-regular

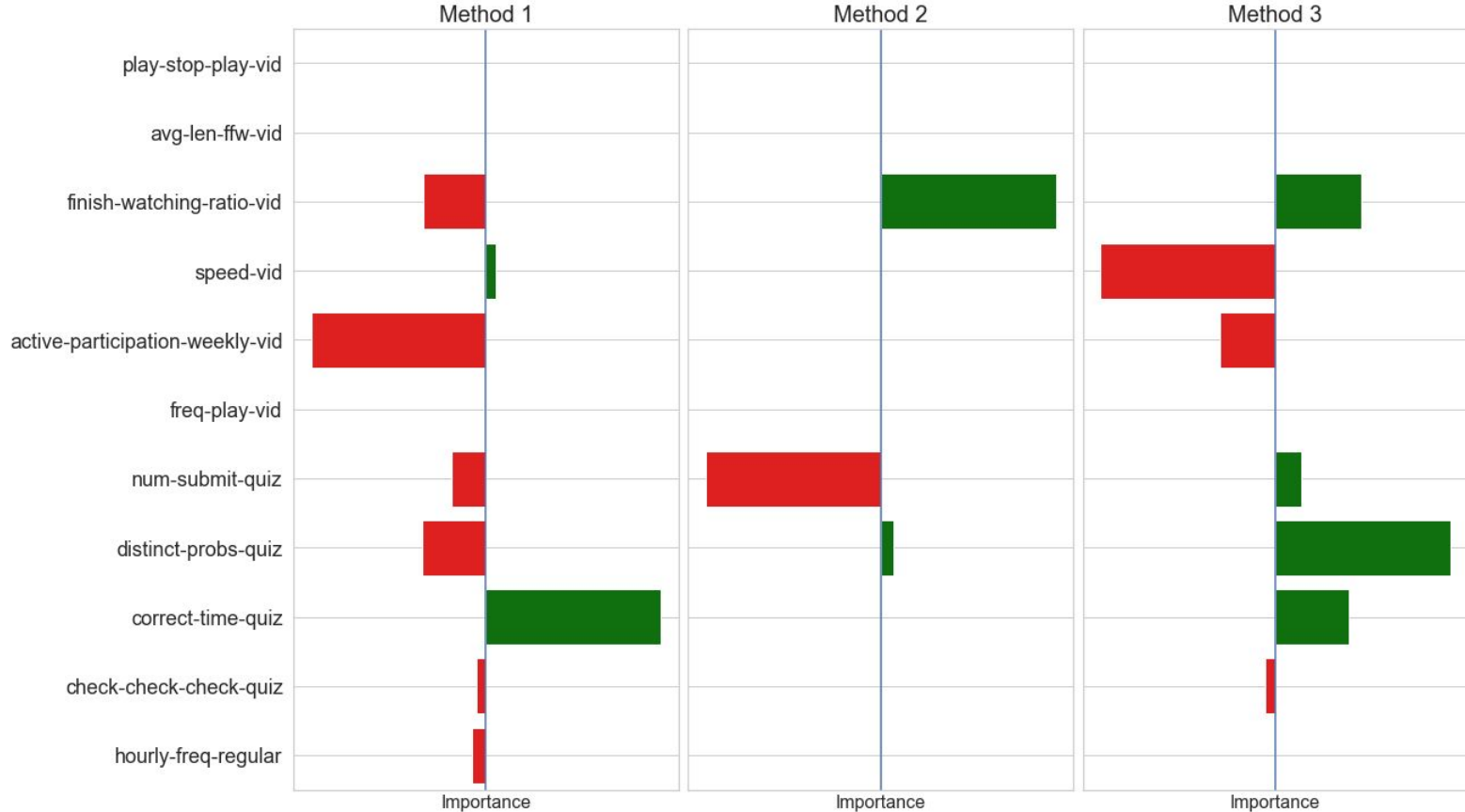


# Flipped Programming Course





# MOOC Programming Course



# Comparing both courses

Comparing our flipped programming course to our MOOC course, our XAI models note the following insight:

- **important indicators of student success:**  
**check-check-check-quiz** (end of course)  
**correct-time-quiz** (all of the course)
- **important indicators of student failure:**  
**attendance-rate** (end of course)  
**content-alignment** (middle of course)

Do you agree with these insights?

# Comparing both courses

Comparing our flipped programming course to our MOOC course, our XAI models note the following insight:

- **important indicators of student success:**  
check-check-check-quiz (end of course)  
correct-time-quiz (throughout the course)
- **important indicators of student failure:**  
attendance-rate (end of course)  
content-alignment (middle of course)

**How could you use these insights to transition a curriculum from flipped to MOOC?**

Thank  
you!

The background of the slide is an aerial photograph of the EPFL campus. In the foreground, there are several modern buildings with flat roofs, some featuring solar panels. A prominent red sculpture is visible on the left. In the middle ground, a large, white, wavy-roofed building stands out. The campus is surrounded by greenery and trees. In the background, a large body of water (Lake Geneva) is visible, with mountains in the distance under a dramatic, cloudy sky.

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## Background

Imagine you are the Professor of a numerical analysis MOOC course on Coursera.

Your NA course is offered worldwide in French to 506 students for 9 weeks, with a lot of videos and few quizzes, culminating in a final exam.

Scenario

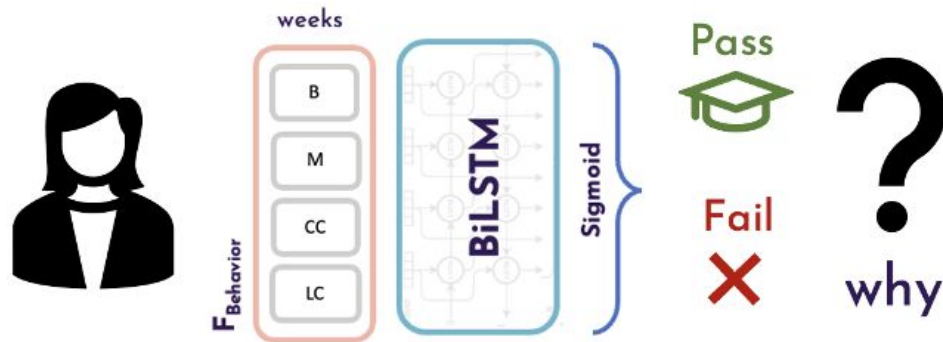
Your professor friend has a Geomatique MOOC in the same area as yours (**mathematics**) with the same student population, but **significantly more problems than videos**.

Their MOOC course is offered by a Swiss university to **452 students** for **11 weeks**, with both **quizzes + videos**, culminating in a final exam.

**Scenario  
cont.**



We train a model on student success prediction for both courses.



3 XAI methods

# Methods

Goal: Use explanations extracted from this models to inform course design.

# Analyse Numérique pour Ingénieurs and Éléments de Géomatique

## Video

total-time-vid

freq-pause-vid

## Activity

std-time-session

ratio-clicks-weekend

## Quiz

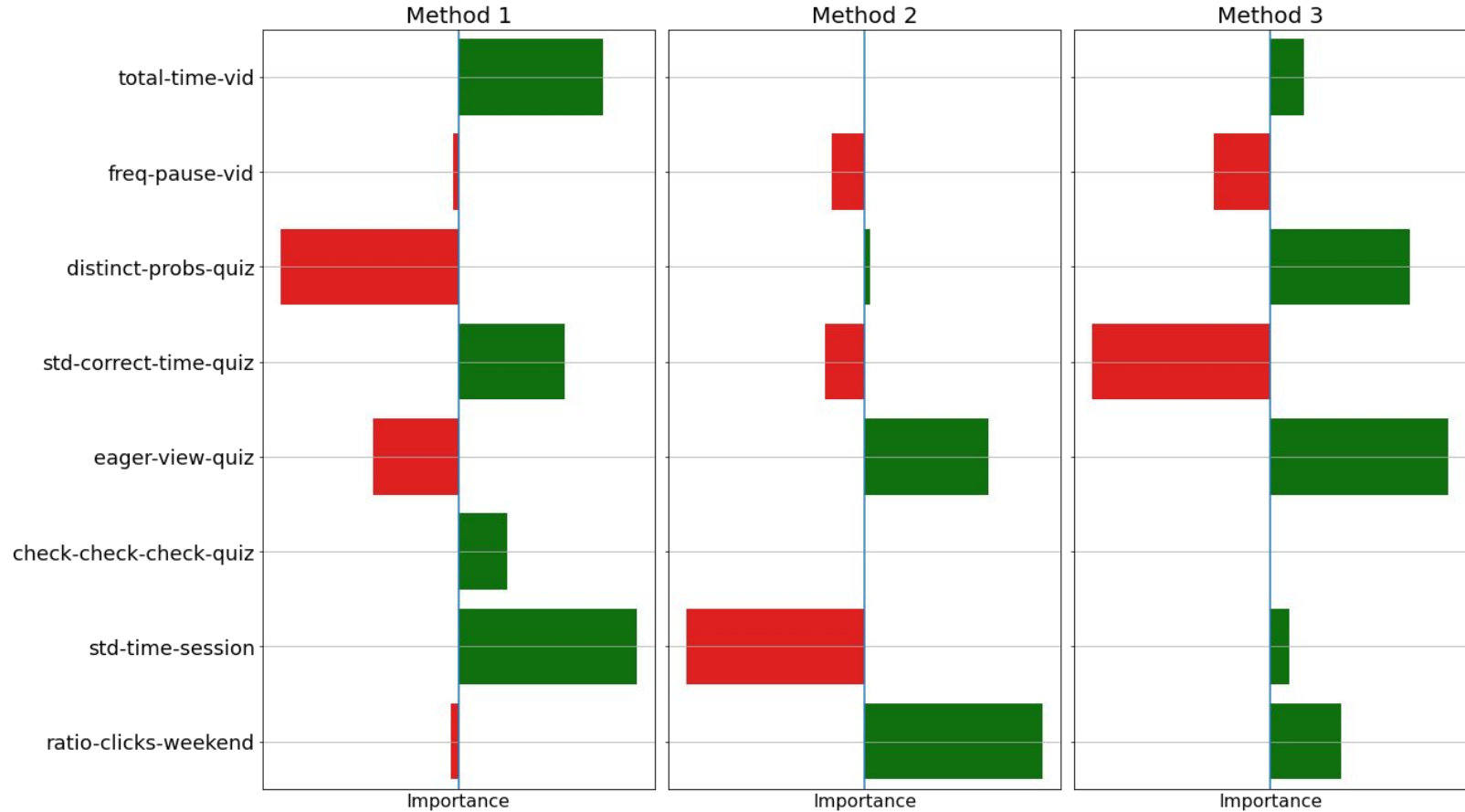
distinct-probs-quiz

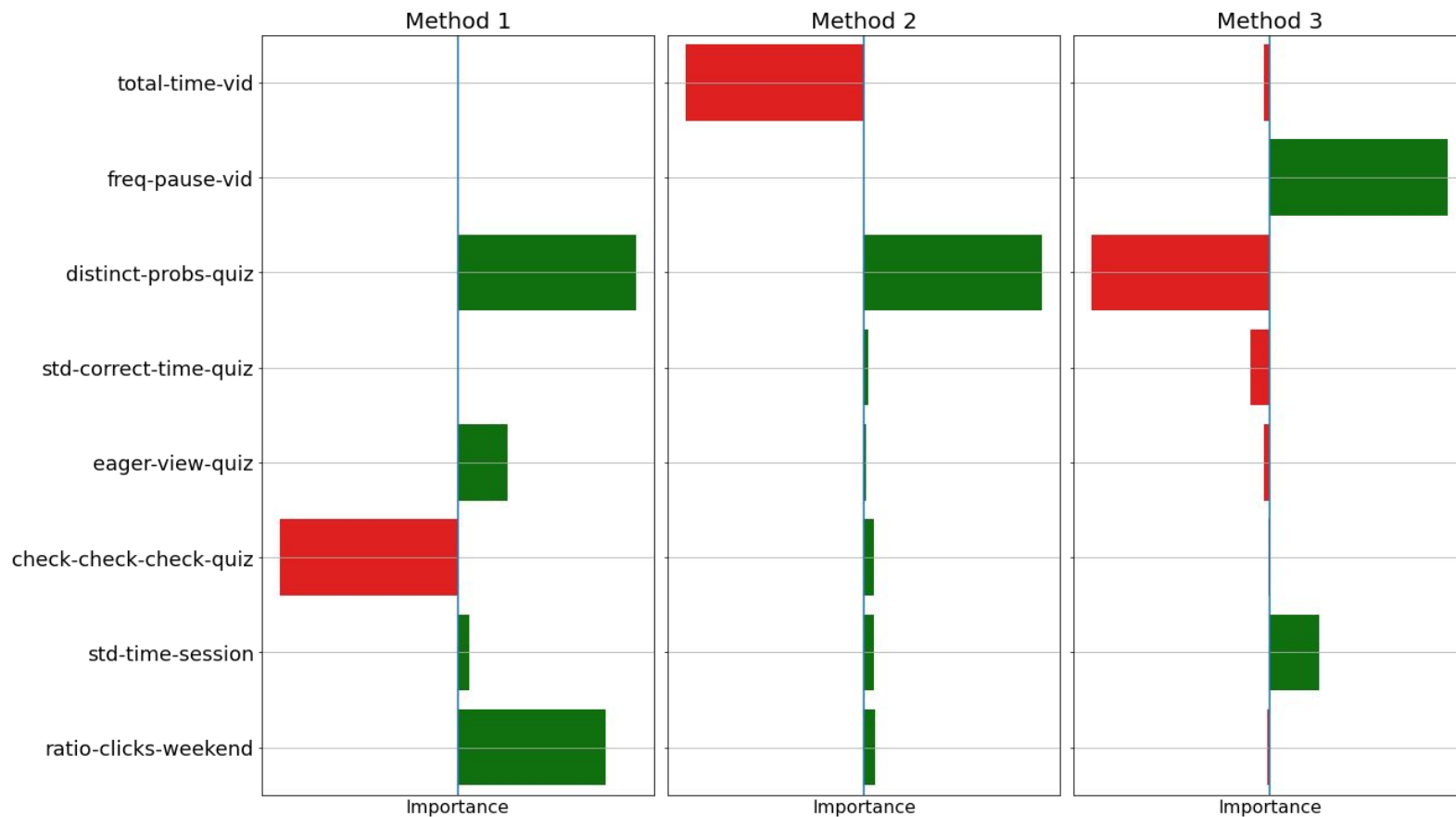
std-correct-time-quiz

eager-view-quiz

check-check-check-quiz







# Comparing both courses

Comparing our low active learning course (AN) to our high active learning course (Geo), our XAI models note the following insight:

- **important indicators of student success:**  
play-pause-load-vid (start of course)  
pause-speedchange-play-vid (mid course)
- **important indicators of student failure:**  
content anticipation (end of course)  
correct-time-quiz (end of course)

Do you agree with these insights?

# Comparing both courses

Comparing our low active learning course (AN) to our high active learning course (Geo), our XAI models note the following insight:

- **important indicators of student success:**  
play-pause-load-vid (start of course)  
pause-speedchange-play-vid (mid course)
- **important indicators of student failure:**  
content anticipation (end of course)  
correct-time-quiz (end of course)

How could you use these insights to transition a curriculum from low to high active learning?

Thank  
you!

An aerial photograph of the EPFL campus in Lausanne, Switzerland. The image shows a large, modern building complex with a distinctive white, undulating roof. The campus is surrounded by greenery and a large body of water (Lake Geneva) in the background, with mountains visible under a dramatic, cloudy sky. A red rectangular box is overlaid on the right side of the image, and a dark grey rectangular box is overlaid in the lower center.

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