

# iExam: Leveraging Automatic Face Recognition for Online Exam Monitoring and Analysis

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# Online Teaching V.S. Online Examination



(Lecture-based) Online teaching could be **smooth** and **enjoyable**

Online examination could be **challenging** and **frustrated**

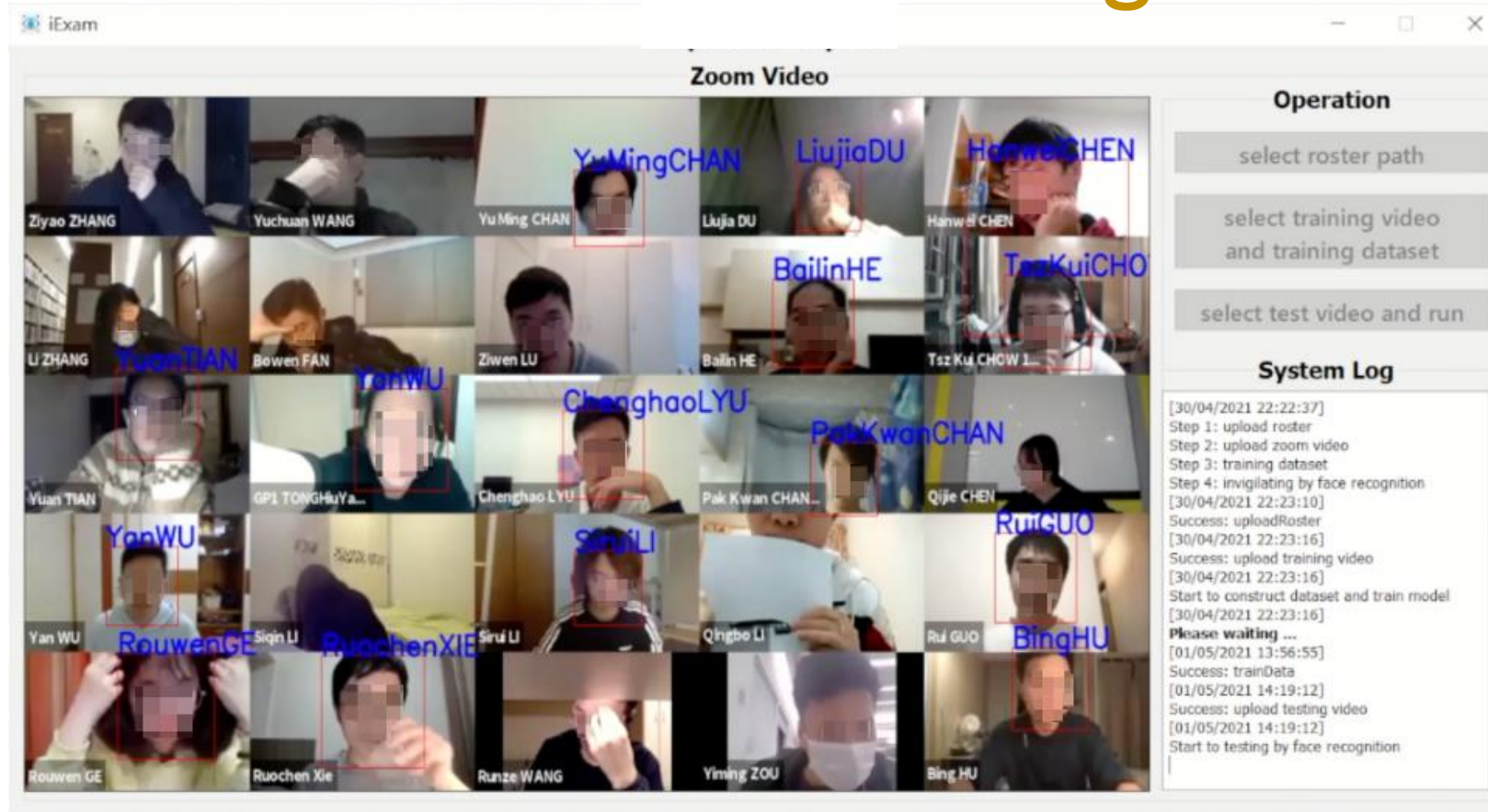
# Some feedback from the CUHK professors

“For XXXCouse in the past year and this year, we are adopting the mode of **open-book** and **no-invigilation** for the online final exam.”

“There will be an online final exam in my course but it is going to be **non-invigilated**. I tried an invigilated one for the midterm last spring but I found it too problematic.”

Could we maintain the assessment quality even in the online exam scenario?

# iExam: An Online Exam Invigilation System Based on Face Detection and Recognition



**Real-time Exam Monitoring**

(Only the design currently)

**Post-exam Analysis Component**

(Nearly done)

# Lightweight Real-time Video Analysis

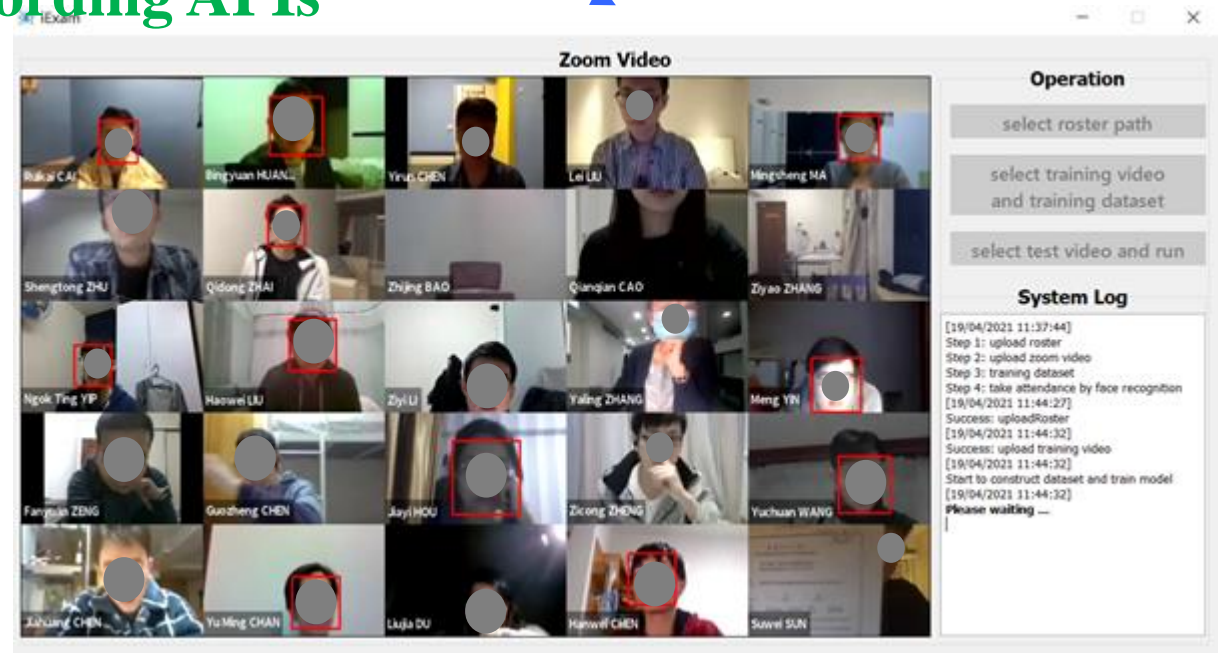
**Objective:** **detect** faces only and be **fast** (do not \*recognize\* faces).

Capture real-time video frames from Zoom via

**Screen Recording APIs**



Monitor 1 for **Zoom**



Monitor 2 for **iExam**

# Comprehensive Post-exam Video Analysis

- **Objective:** face recognition to detect **abnormal behaviors**
- **Challenge I:** how to **automatically** collect the ground truth for the student faces with **dynamic positions**?

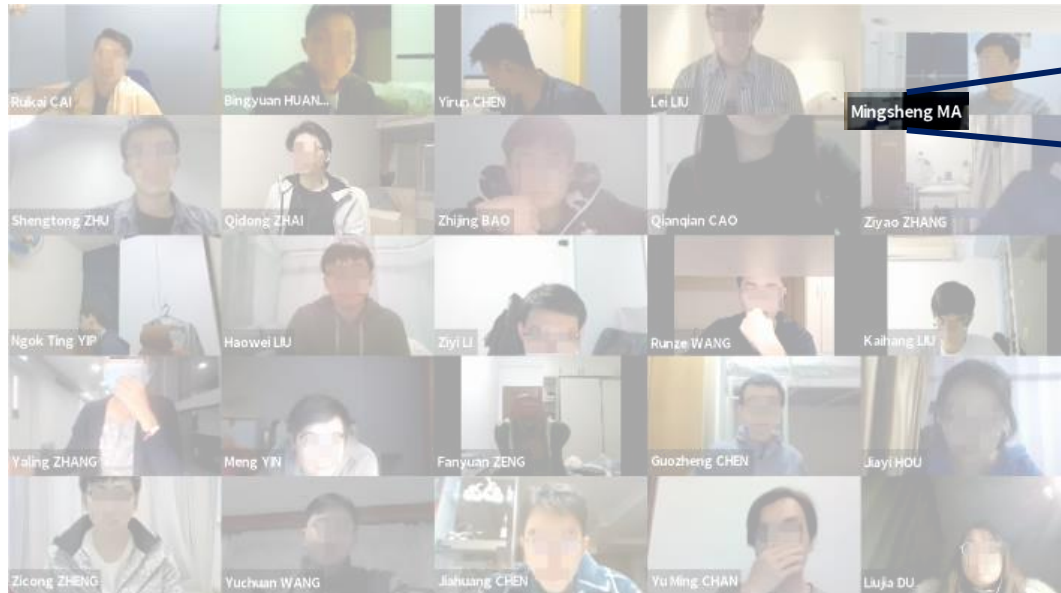


**Inconsistent**



- **Challenge II:** **Efficient** Face Training and Recognition (skipped in this talk)

# Leverage the left-corner names on Zoom



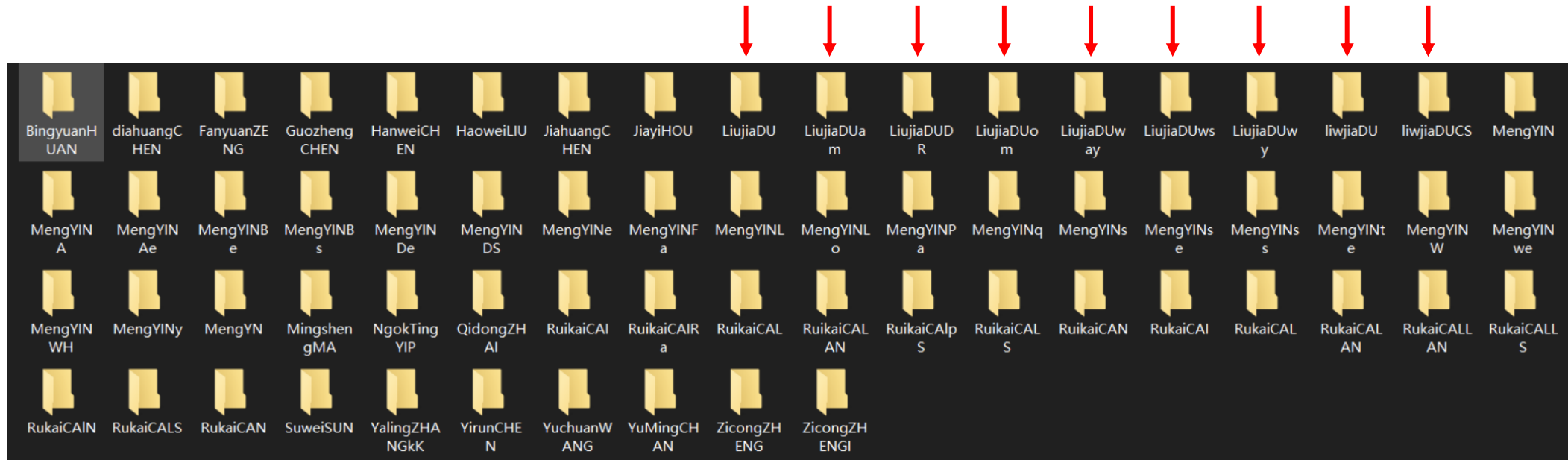
Mingsheng MA

Optical character  
recognition (**OCR**) to  
obtain the names



# OCR is not perfect

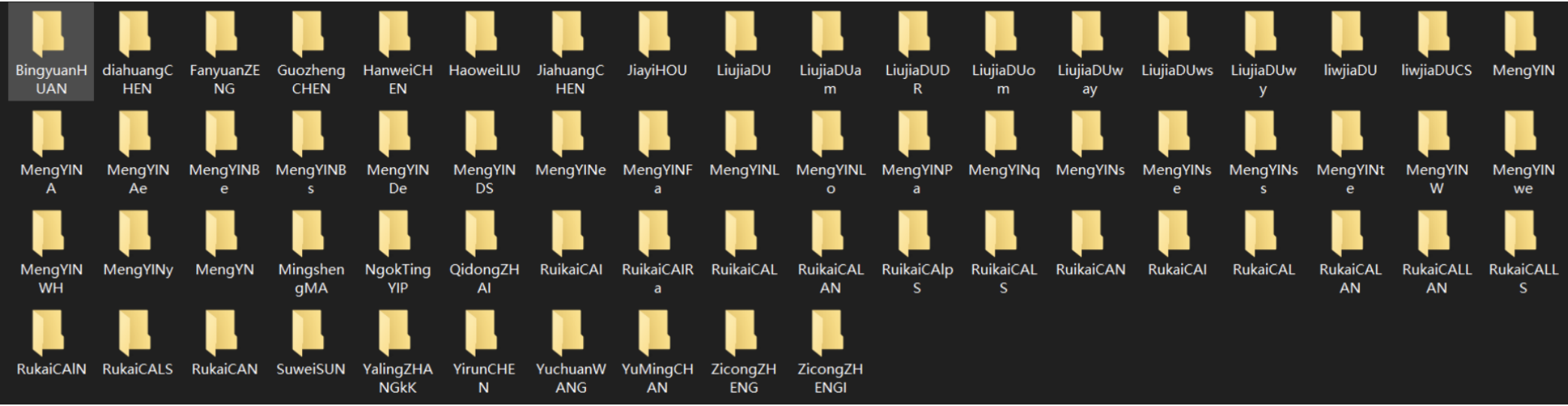
- We observed many similar results for the same person because OCR results could be different in different video frames.



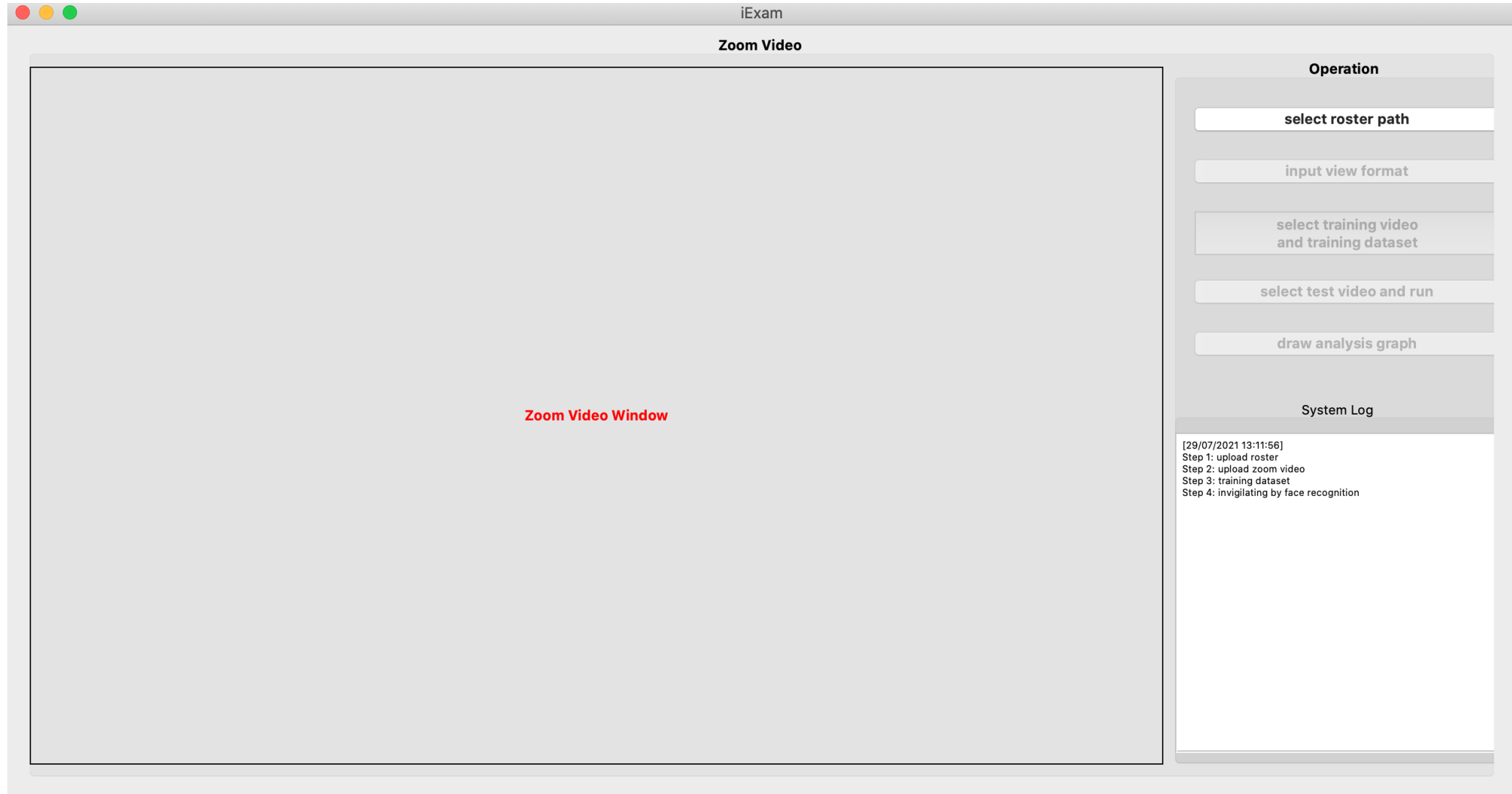
# That's why iExam needs the student roster

- 1. Check whether the name in roster is a **substring** of the folder name
- 2. Calculate the **similarity** between the name in roster and the folder name

“LiujaDU” is a name in the roster



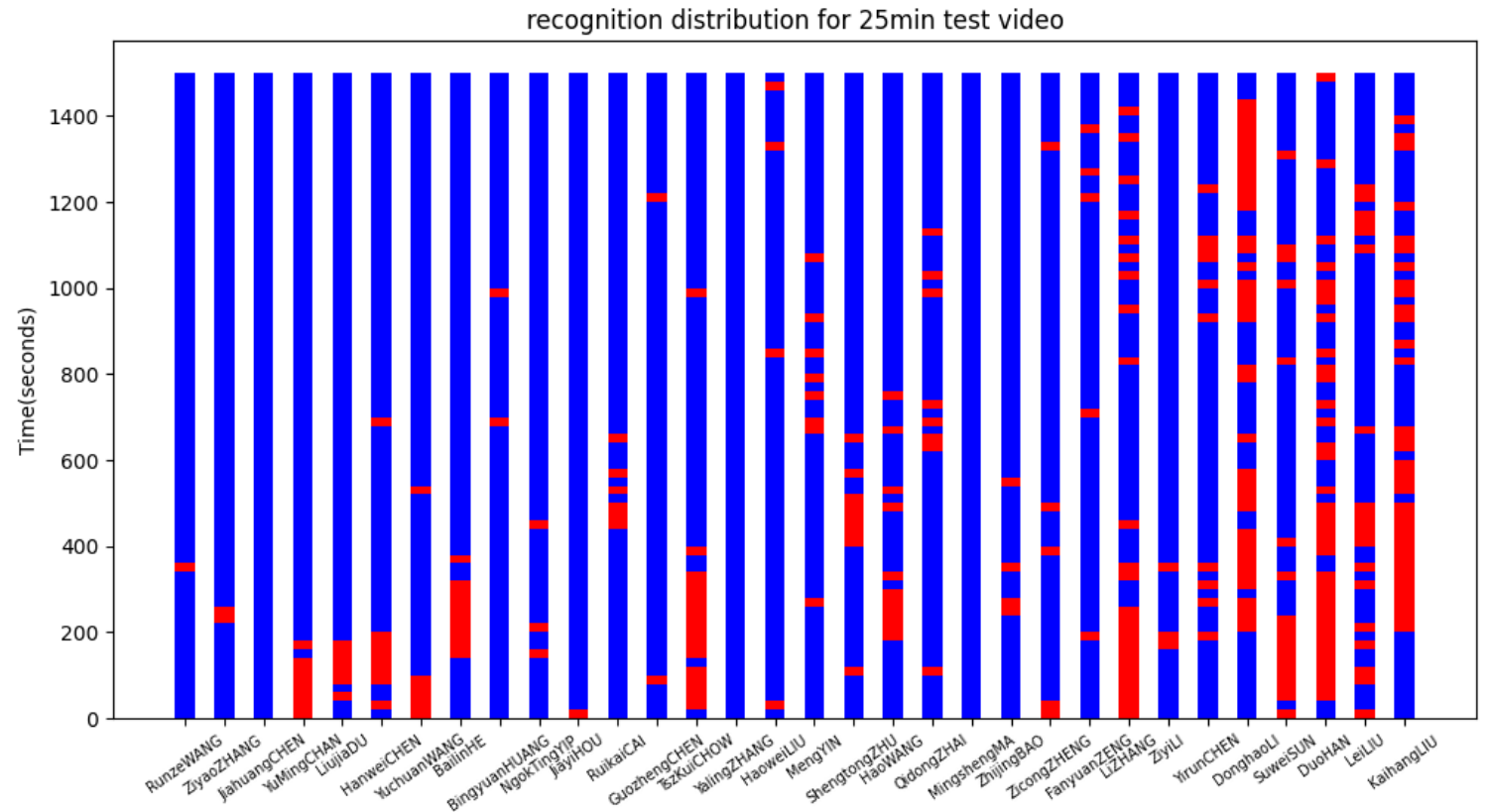
# iExam (Live) Demo



# Some kinds of post-exam analysis results

```
The following people have not be recognized from 0s to 20s:  
JiayiHOU  
LeiLIU  
LiZHANG  
SuweiSUN  
YuMingCHAN  
YuchuanWANG  
ZicongZHENG  
The following people have not be recognized from 20s to 40s:  
HanweiCHEN  
HaoweiLIU  
LiZHANG  
TszKuiCHOW  
YuMingCHAN  
YuchuanWANG  
ZicongZHENG  
The following people have not be recognized from 40s to 60s:  
DuoHAN  
LiZHANG  
LiuJiaDU  
SuweiSUN  
TszKuiCHOW  
YuMingCHAN  
YuchuanWANG  
The following people have not be recognized from 60s to 80s:  
DuoHAN  
LiZHANG  
SuweiSUN  
TszKuiCHOW
```

Raw result log



Visual chart result

# How to Operate iExam in your exam?

- Before the exam:
  - Adjust the Zoom setting to the number of your students (Max: 49)
  - Use two computer monitors; Ask your students to use **official names** on Zoom.
- During the exam:
  - Release the e-paper and Record the ID-checking video as the training video.
  - Use “**on spotlight**” instead of the **breakout** room if you want to check one particular student so that Zoom still takes the normal video recording.
  - Monitor iExam’s real-time video and focus on those undetected.
- After the exam:
  - Use the iExam as I just demonstrated and run it in the **background**;
  - Ask your TA to check the iExam result and manually check suspicious timings.

# Acknowledgment and Future Plan

- **Team members:** Prof. Jimmy Lee (Co-I), Mr. Xu Yang, and Mr. Xiao Yi.
- The post-exam analysis component of iExam is being **supported** by the CDG entitled “An Online Exam Invigilation System Based on Face Recognition”.
- iExam will be **opened-source** at <https://github.com/VPRLab/iExam>.
- Register your **interest** of using iExam at <https://tinyurl.com/iExamCU>.
- We are writing a conf **paper** about iExam so that you can know more about it.