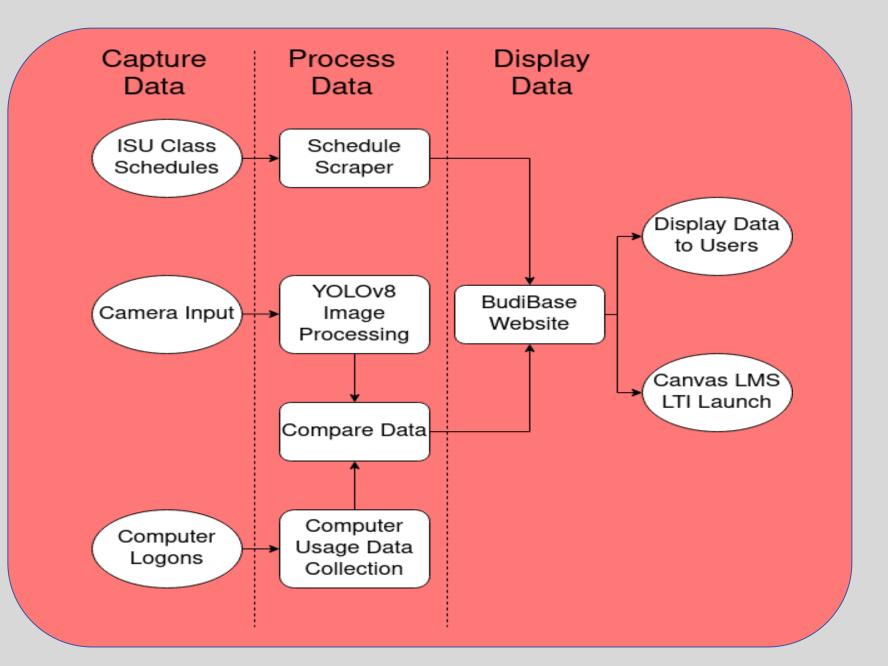
CLARE: Lab Availability Tracker

SDDec23-04

Introduction

- Engineering students want a way to plan ahead
- Iowa State does not have a convenient way to remotely determine how busy a lab is
- CLARE provides a solution utilizing computer usage tracking and computer vision







COOVER 1041

CYB E 331 is using this lab until 10:50am

Current usage: 15/24

Monday	Tuesday	Wednesday	Thursday	Friday
8:00am				<u> </u>
9:00am 10:00am	CYB E 331 Section 2 9:00am - 10:50am	CYB E 331 Section 1 8:50am - 10:40am	CYB E 230 Section 1 9:00am - 10:50am	CYB E 230 Section 2 8:50am - 10:40am
11:00am				
12:00am			CYB E 230 Section 3	
			11:00am - 12:50pm	CPR E 388 — Section 2 —
1:00pm				12:05pm - 1:55pm
2:00pm	CYB E 230			CYB E 231
3:00pm	Section 4 2:10pm - 4:00pm			Section 3 2:10pm - 4:00pm
4:00pm	CYB E 231		CPR E 388	
5:00pm	Section 1 4:10pm - 6:00pm		Section 1 4:10pm - 6:00pm	
6:00pm	CYB E 331			
7:00pm	Section 3 6:10pm - 8:00pm			
8:00pm		<u> </u>		<u></u>
Historical Usage				
Tuesday				~
24				
18				
12				
12				
6				
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Requirements

- Achieve 90% accuracy
- Display data on a website
- Integrate with Canvas
- Cost less than ISU's current solution

Technical Details

Website

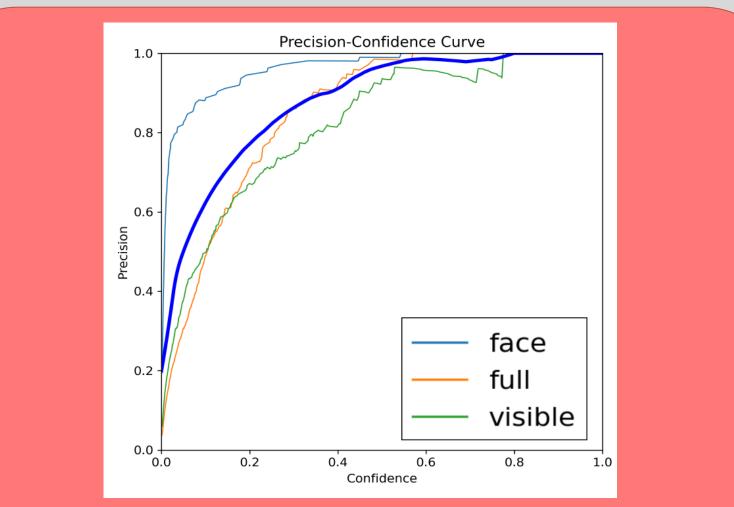
- Built on BudiBase a low-code solution
- MySQL database
- Custom Svelte schedule UI
- Automated scripts to update schedule and historical usage
- Image Processing
- YOLOv8 machine learning algorithm
- Built on PyTorch framework
- Images retrieved using webcam in lab room
- Determines lab occupancy using object detection
- Images are destroyed after processing

Desktop login Tracking

- Compatible with Windows & Linux
- Uses iNotify and Windows Task Scheduler
- Tracks logins/logoffs Not users

Testing

- Automation and data processing run on short scripts
- Each script is tested individually in a unit test fashion with various inputs
- The more complex image processing and schedule parser are tested as a whole and checked that BudiBase was updated with the expected data



Testing results for ML model trained on "CrowdHuman" dataset

Resources

- Camera: \$70, unused one provided by ETG
- Server resources for website hosting
- BudiBase: Free tier
- Nvidia GPU (for ML): \$500

Engineering Standards

- IEEE 1016-2009 (Software Design Description)
- IEEE 23026-2015 (Website lifecycle)
- ISO/IEC/IEEE 29119 (1 4, Software testing)

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