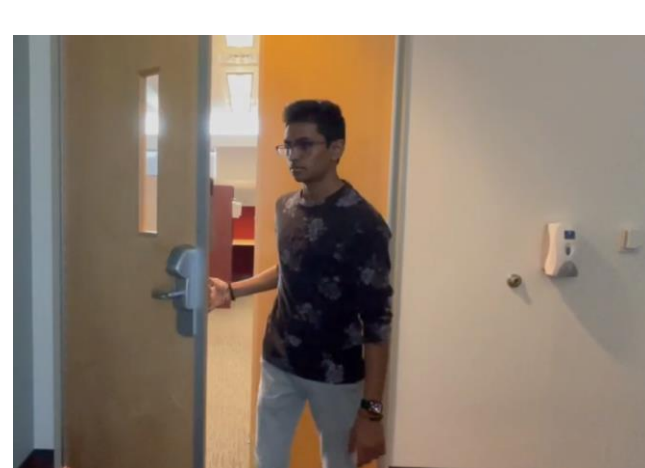


Motivation

- Need for **automated** processing of videos for **identifying embedded situations**.
- Expressing complex situations as queries **and detecting them correctly**.
- Interesting** Situation examples in videos.



A delivered package **stolen** Two person **crossing**



Same person **entering and exiting** a building

Applications:

- Surveillance** (of residential areas, parking lots, shopping mall, etc.)
- Civilian usage** (traffic, concerts, protests, etc.)
- Assisted Living Monitoring**
- ...

Current State-of-the-Art Approaches

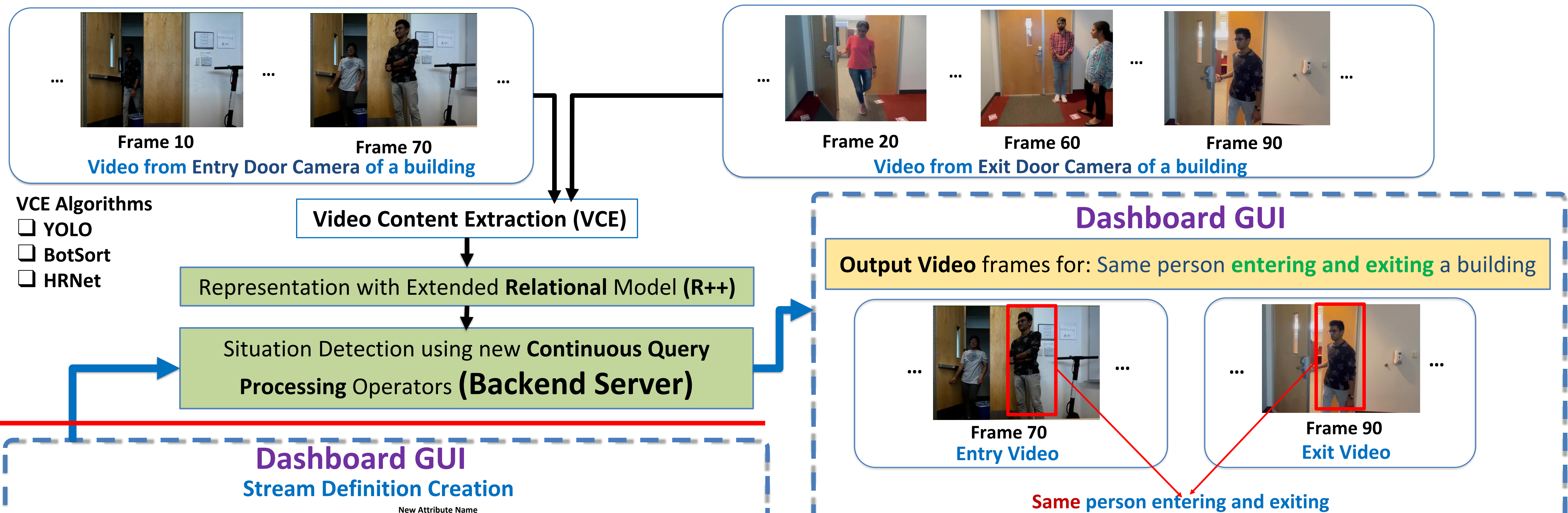
- Manual (Labor- and time-intensive)**.
- Custom Algorithms (situation specific; not general purpose)**
- Both approaches are **not practical** for real-time or forensic video analysis.

Objectives

- Develop a framework for general-purpose **Situation Detection** in Videos.
- Intuitive to **understand and use**
- Hence, a **Web dashboard** to specify situations and visualize results
- A **server** for processing requested situations as queries

VideoScoop FrameWork

Situation: Same person entering and exiting a building



Dashboard GUI

Stream Definition Creation

Stream Name: Entry_Video

Attributes:

- FrameID
- ObjectID
- BB
- Label
- Conf

New Attribute Name: Feature_Vector

Type: Primitive Types

String

Integer

Float

Double

Boolean

Vector

Complex Vector

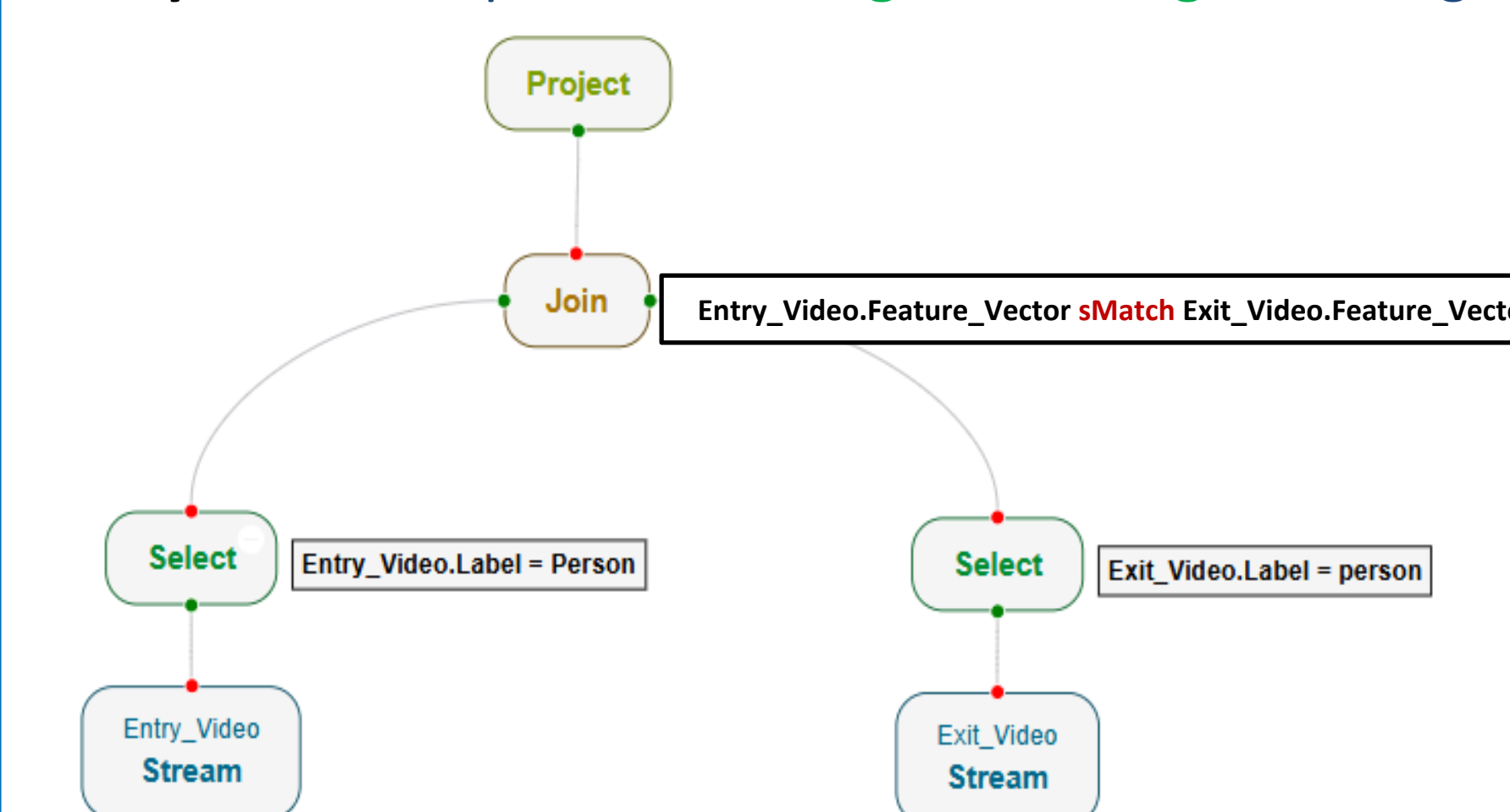
Sequence

Sequence of Sequence

Cancel

Save

Query For: Same person entering and exiting a building



Query Name: Same_Person_Present

Query Description: This query was created by HB on April 3, 2026 Purpose: Innovation Day

Operators:

Select

Project

Join

Group by

Split

Event Generator

Available streams:

StreamC

Video1

Video2

Entry_Video

Exit_Video

Generate

Map Stream and Data File

Query Name: Same_Person_Present

Mapping Name: MappingA

Description: This binding was generated by Hafsa

Stream: Entry_Video

Data Files:

Select data file

S1_tlab_y8_bs_hnet.vdat

S2_tlab_y8_bs_hnet.vdat

Generate Bind File

Prepare Query For Execution

Binding Name: Binding1

Description: This binding was generated by Hafsa

Mapping Selection:

Select Mapping

MappingA

MappingB

Query Execution Parameter Selection

Step 1 of 8: Window_type

Time-based window

Frame-based window

Video

Step 2 of 8: Start_time

Now

Schedule

seconds

30

Step 3 of 8: End_time

End of input

Time

Step 4 of 8: Window_size

frames

50

Step 5 of 8: Hop_size

frames

30

Step 6 of 8: Scheduling_strategy

Round Robin

Weighted Round Robin

Path Capacity Scheduling

Segment Scheduling

Simplified Segment Scheduling

Step 7 of 8: Schedule_query_at

NOW

YYYY-MM-DD-HH:MM:SS

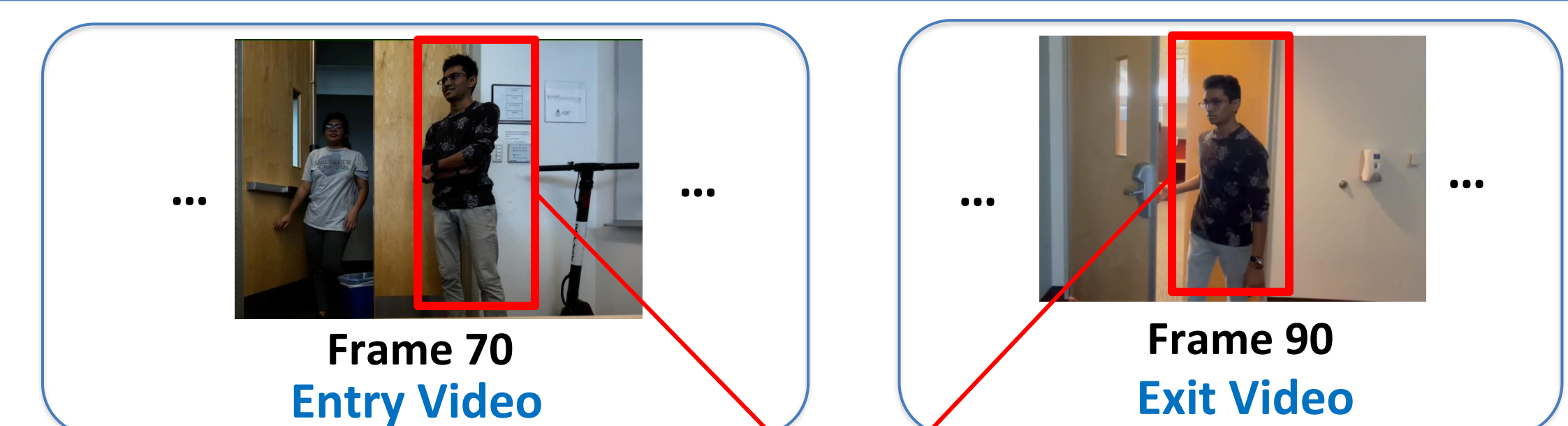
Step 8 of 8: Run_time_optimizer

Off

On

Dashboard GUI

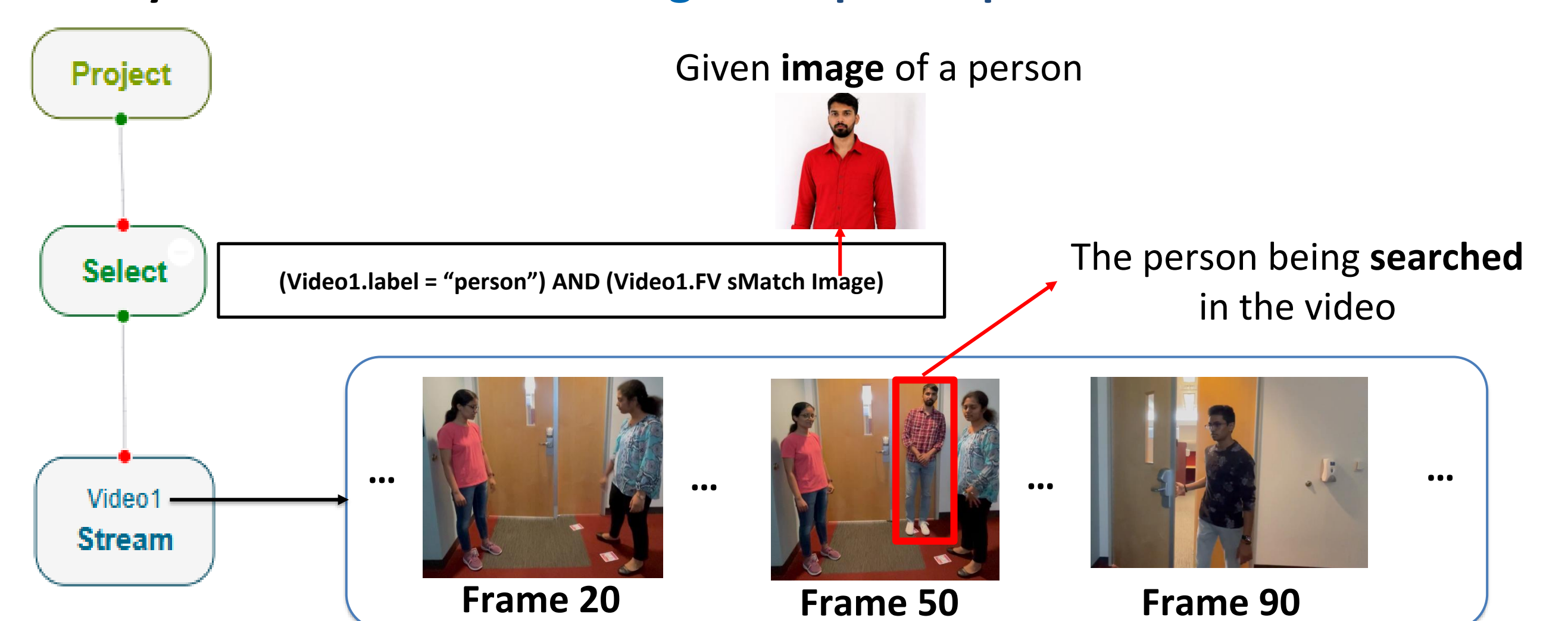
Output Video frames for: Same person entering and exiting a building



Same person **entering and exiting**

Other Queries Built using Dashboard

Query for situation: "Searching for a specific person in a video"



Tech Stack

Dashboard
Front-end: ReactJS, HTML, CSS
Back-end: Flask, Python
Database: SQLite3

VCE: PyTorch
Query Processing: CQL-VA
VideoScoop Server Algorithms are implemented in Java

Conclusion

- "Out-of-the-box" approach for automatic situation analysis
- Developed new **spatial and temporal operators**
- Web dashboard** for easy **situation specification and Result understanding**
- Publications:** DEXA '24, PETRA '24, ADBIS '23, ISVC '16, Two MS Theses
- 1 PhD thesis (in the making)