Facial Recognition of Fútbol Players

Identifying a target player on the Fútbol pitch

Thomas Widdows

Capstone 2 Project Presentation

College Soccer Scholarship Requirement

College coaches require soccer players to submit highlight video and game film to be considered for an athletic scholarship.

Issues facing the Student Athlete

- Recording and processing video is time-consuming
- The athlete must rely on others for game video
- People enjoy watching the game, not being a videographer
- The required hardware and software are expensive.

Significant Financial Implications

- D1 men's soccer programs can give out a maximum of **9.9 scholarships** a year and these can be a mix of **full-ride** scholarships and **partial scholarships**.

- Division I and Division II schools provided more than **$3 billion** in athletic scholarships in 2017

The financial impact of a scholarship is substantial

Who gives scholarships?

Athletic Association	Number of Schools	Number of Athletes	Maximum Number of Scholarships
NCAA Division I	348	139,063	74,243
NCAA Division II	292	85,385	36,343
NCAA Division III	418	144,062	0
NAIA	260	56,354	25,778
NJCAA	464	53,248	41,195
Other	276	39,737	N/A
Total	**2,058**	**517,849**	**177,559**

https://www.ncsasports.org/recruiting/how-to-get-recruited/scholarship-facts

Springboard Project Goal

Identify a target player on the pitch in a photograph

Springboard Capstone Project

- Faces extracted from video (image)
- Facial recognition applied to images
- Target player identified

Post Springboard Enhancements

- Videos of pitch stitched together
- Faces extracted from video (image)
- Facial recognition applied to image
- Target player identified
- Target player tracked
- Create college highlight video

} Springboard Capstone Project

Overview of the Process

- Source photograph from pitch
- Locate probable faces
- Remove objects (non-faces)
- Remove out-of-focus photos
- Apply facial recognition model
- Identify target player

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Source Photo

Locate Faces

Source photograph from pitch
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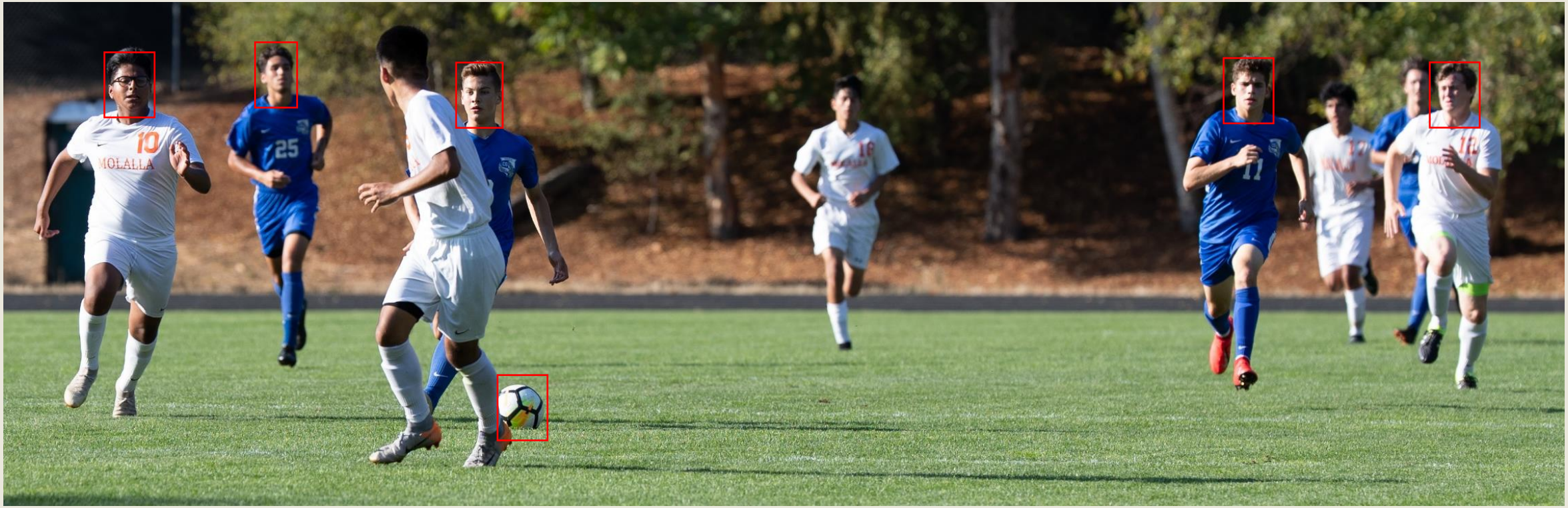
Identify target player



Locate Faces

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Remove objects (non-faces)
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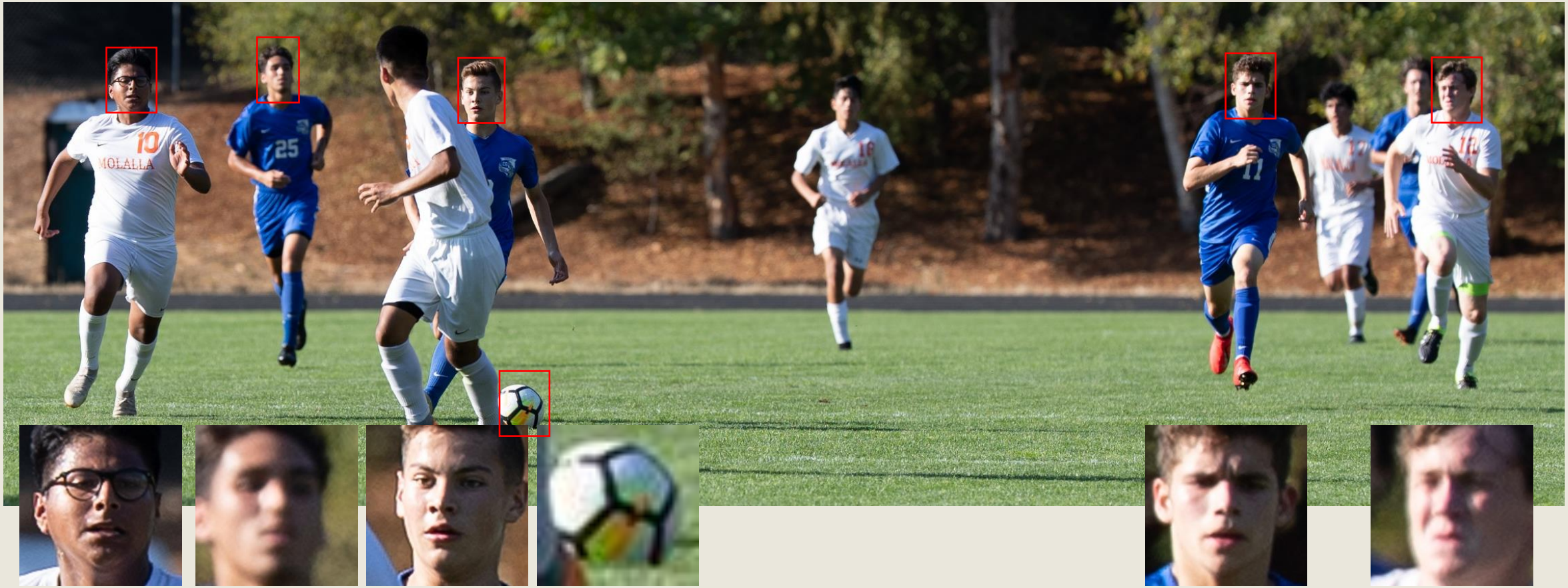
Apply facial recognition model
Identify target player



Source photograph from pitch
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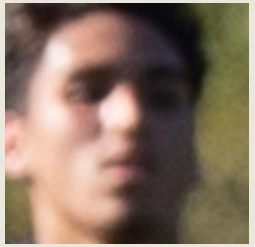
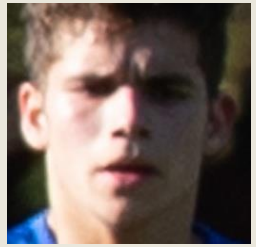
Remove Objects (non-faces)

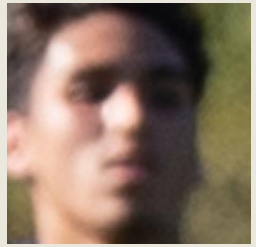



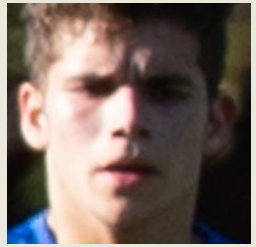




Face vs Object Model

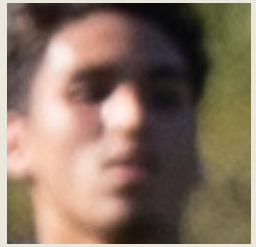
Source photograph from pitch
Locate probable faces
Remove objects (non-faces)
Remove out-of-focus photos
Apply facial recognition model
Identify target player

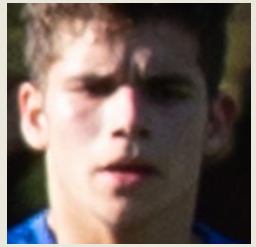
Remove Objects (non-faces)

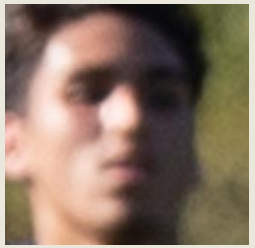

Face vs Object Model

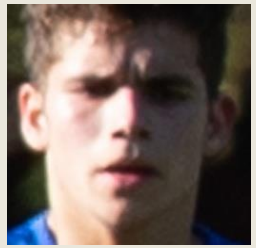






Remove Out-of-Focus Faces

Source photograph from pitch
Locate probable faces
Remove objects (non-faces)
Remove out-of-focus photos
Apply facial recognition model
Identify target player




Focused vs Unfocused Model

Source photograph from pitch
Locate probable faces
Remove objects (non-faces)
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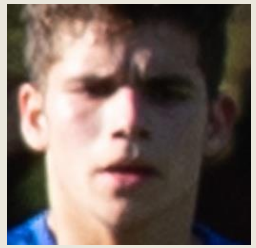
Apply facial recognition model
Identify target player

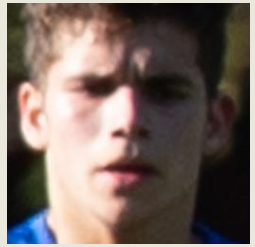
Remove Out-of-Focus Faces




Focused vs Unfocused Model

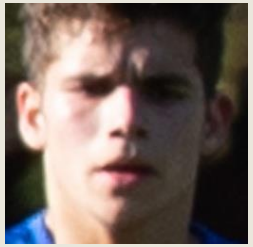




Identify Target Player

Source photograph from pitch
Locate probable faces
Remove objects (non-faces)
Remove out-of-focus photos
Apply facial recognition model
Identify target player





Recognizer Model

Source photograph from pitch
Locate probable faces
Remove objects (non-faces)
Remove out-of-focus photos
Apply facial recognition model
Identify target player

Identify Target Player



Recognizer Model

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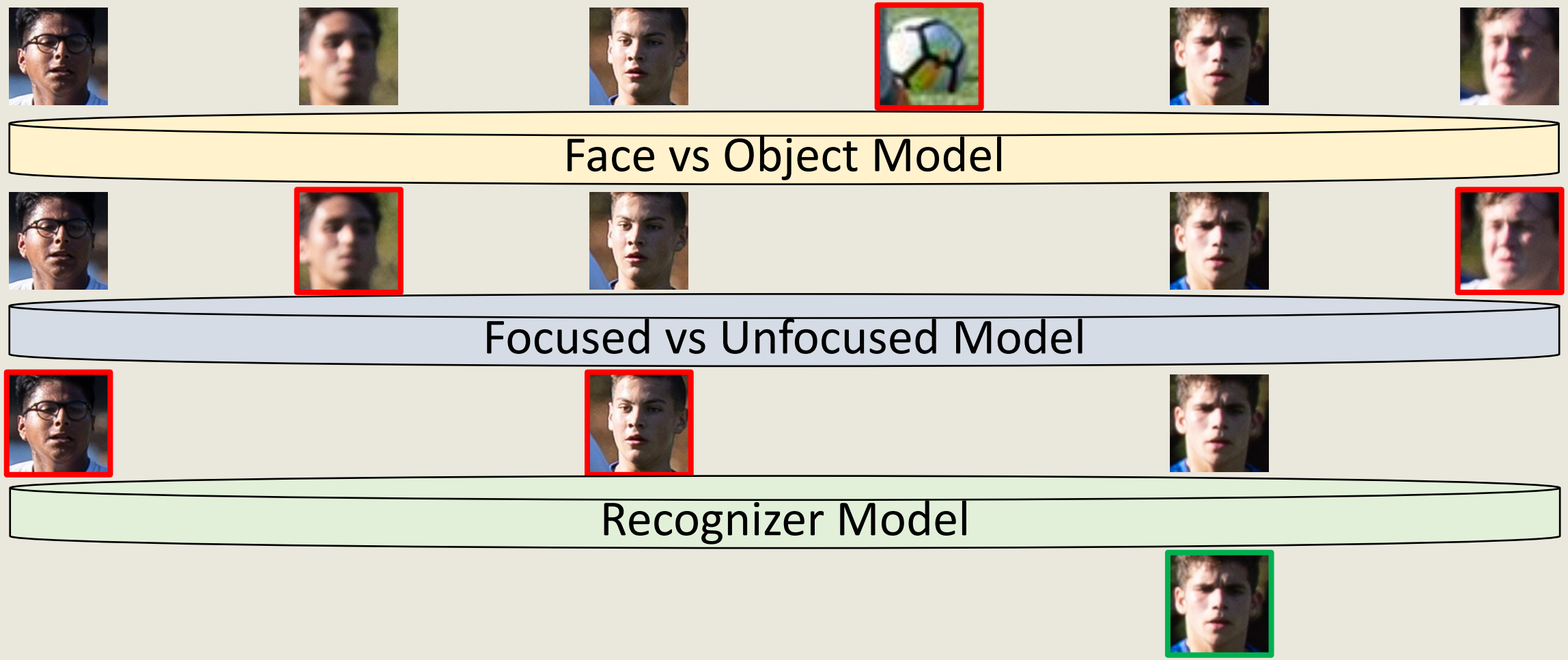
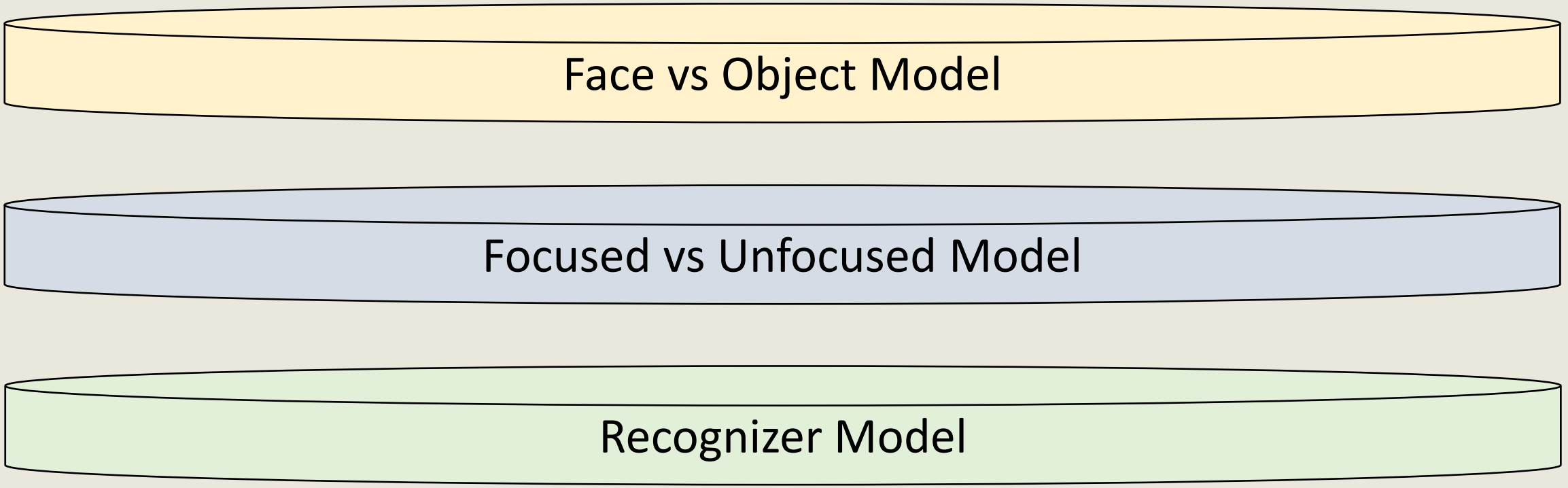
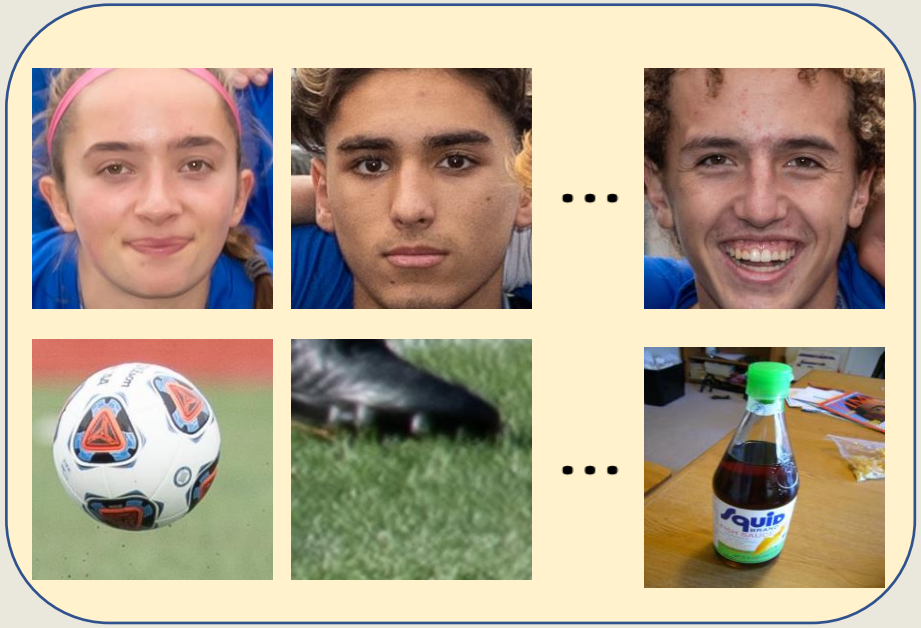
Identify Faces and Apply Models



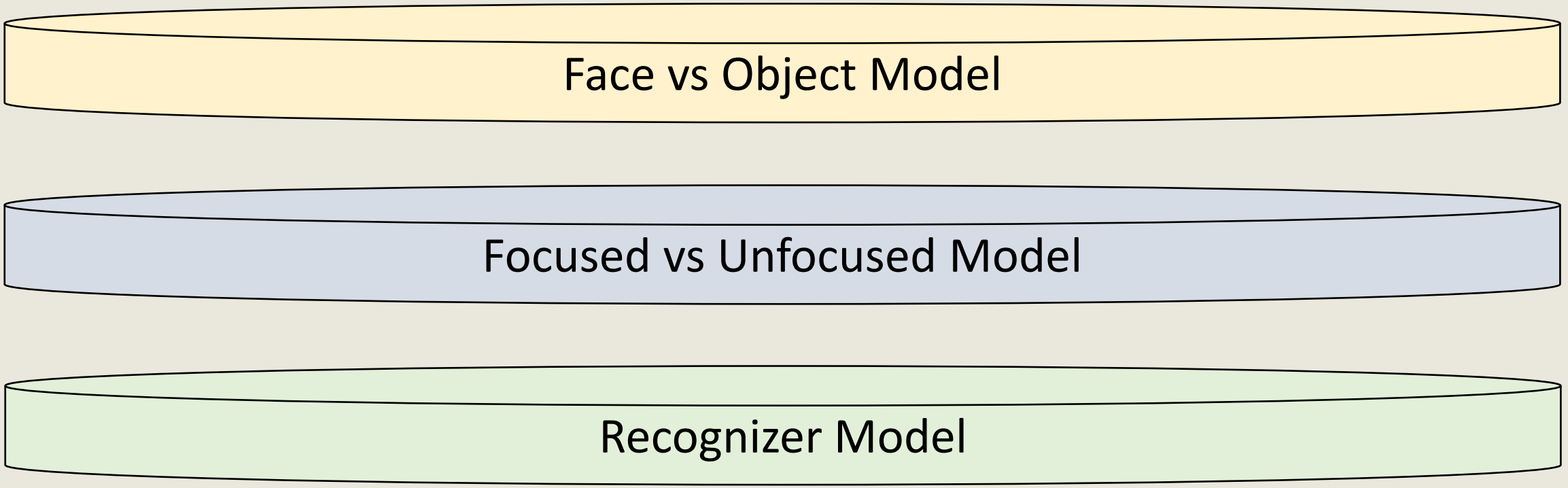
Models Trained



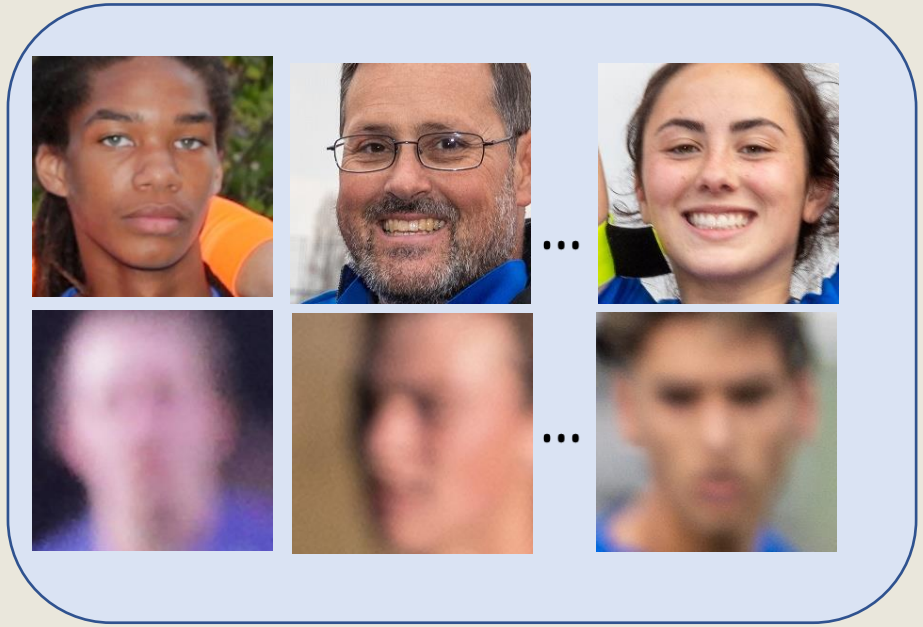
Train “Face vs Object Model”



Model Trained



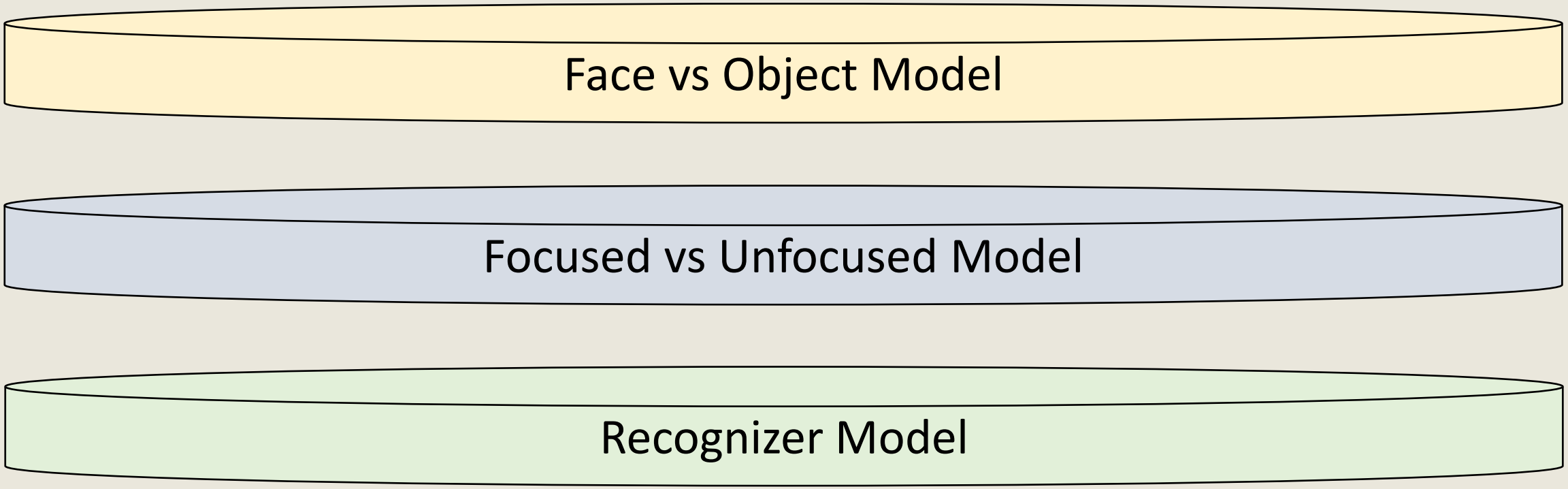
Train “Focused vs Unfocused” Model



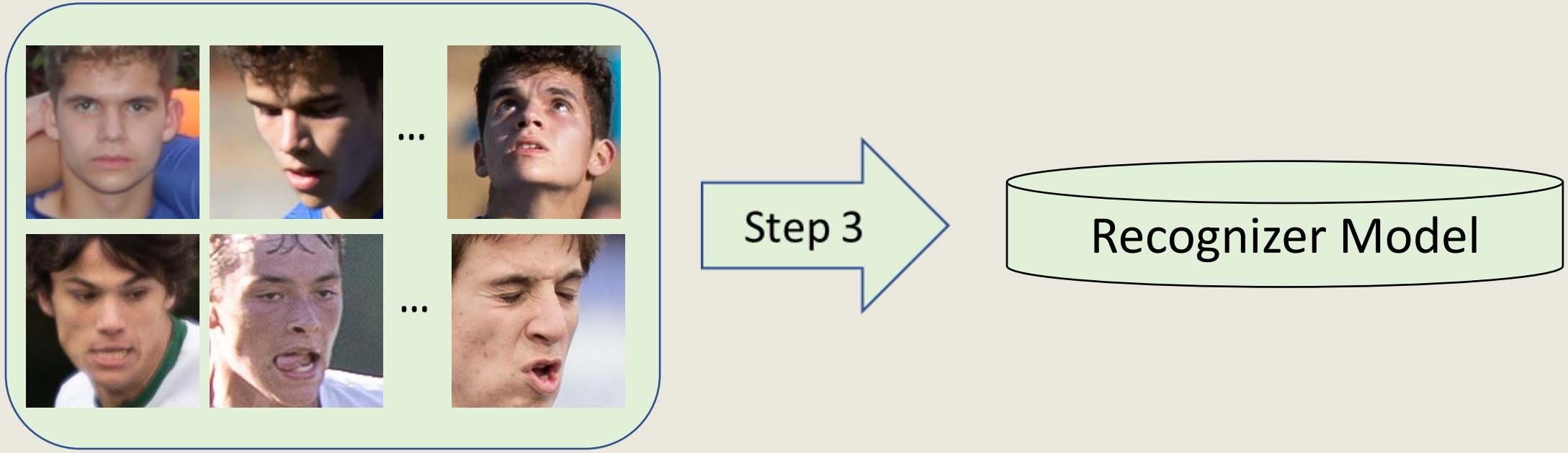
Step 2

Focused vs Unfocused Model

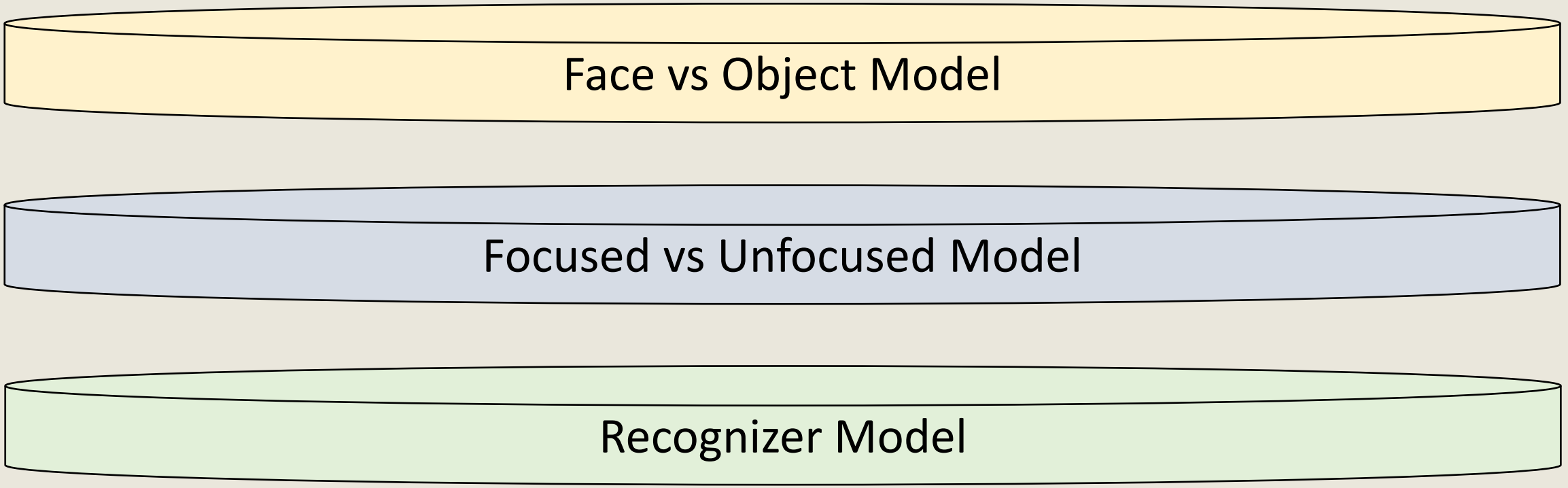
Models Trained



Train Facial Recognition Model



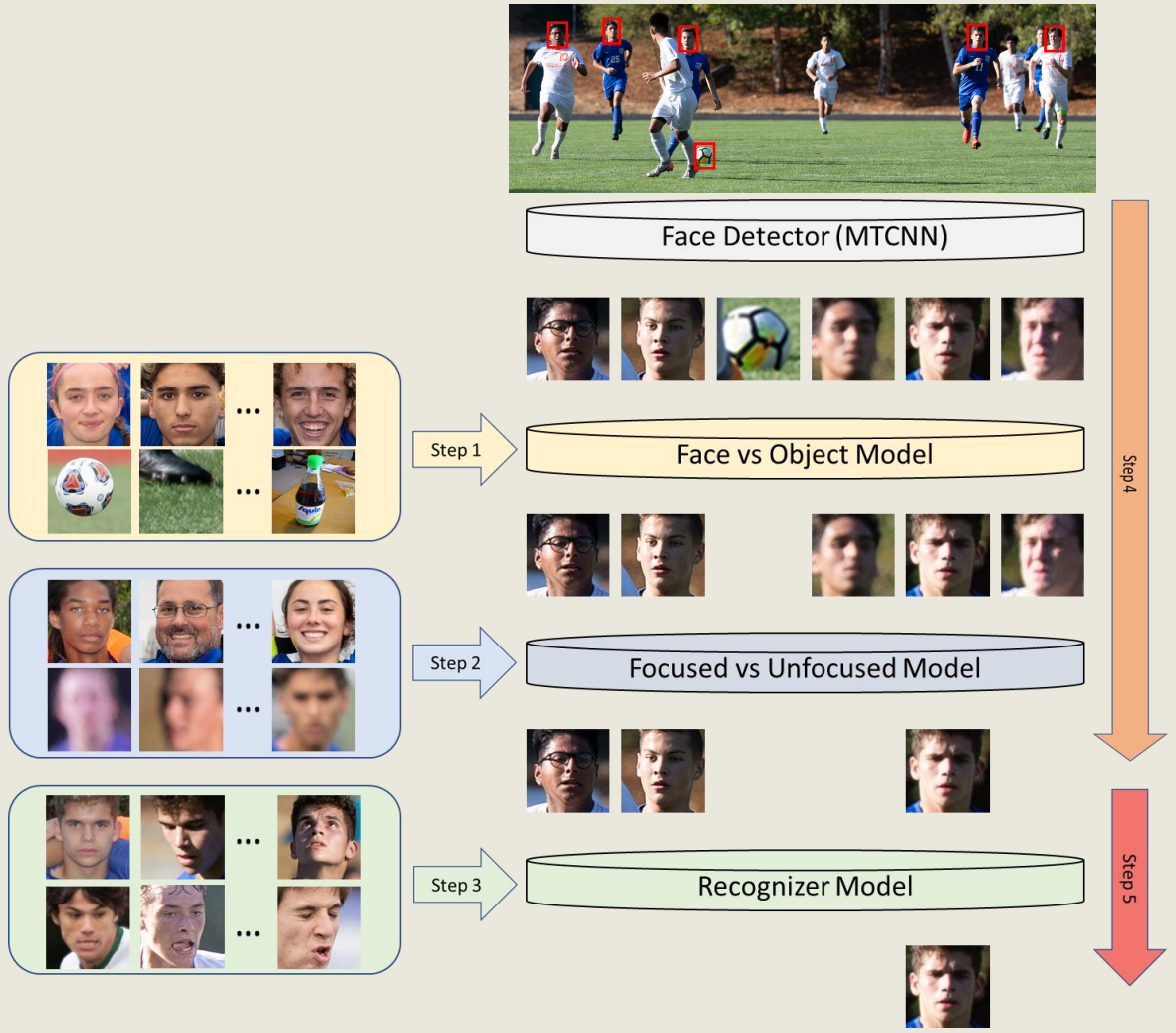
Models Trained



Steps

- Step 1: Train and Save Face vs Object Model
- Step 2: Train and Save Focused vs Unfocused Model
- Step 3: Train and Save Recognizer Model
- Step 4:
  - Process faces through Face Detector Model
  - Process faces through Face vs Object Model
  - Process faces through Focused vs Unfocused Model
- Step 5: Process faces through Recognizer Model

Unless the target player is changed, Steps
1, 2 and 3 only need to be executed once to create and save the models. Steps 4 and 5 will continue to use the saved models. If you change your target player, step 3 (Recognizer module) will need to be updated.



Recommendations

- A current computer with a GPU and fast drive will be required to run the application
- Image acquisition is critical for good facial recognition.
  - Aperture should be closed down
  - Speed 1/1000 second or faster
  - Entire pitch must be in focus
- Have multiple photos of your players from different angles
- Teammates should be included with unknown faces

Identifying a target player on the Fútbol pitch

Questions and Answers