Charlotte Merch Detector

ITCS 5010: Intro to Computer Vision

Introduction

Batman Whiteside

Aiden Valentine

Alvajoy Asante

Santhosh Balla

Sofia Mata Avila

Our Problem and Motivation

The **main problem** we address is measuring how many students wear *UNCC merchandise* at sporting events and other campus gatherings.

Our **motivation** is to create a *data-driven* method for understanding **engagement**, **attendance**, and **school spirit**—information that could be useful for *analytics*, *marketing*, and *event management*.

Our Dataset

Positives

Negatives

3 Classes: UNCC Headgear, UNCC Torso, UNCC Logo
722 samples *before* augmentation, 1227 *after*
Data Split: Train 82%, Validate 12%, Test 6%
Datasets: UNCC Photos Page, Barnes and Noble UNCC Spirit Store

Our Methodology

Preprocessing:

Images resized and letterboxed to 512×512

Normalized to [0, 1]

Channel order: BGR → RGB

Computational Environment:

Google Colab Pro/Free

NVIDIA Tesla T4 GPU (15 GB VRAM)

CUDA 12.x + PyTorch 2.3.1

Python 3.11

Ultralytics 8.x / YOLOv11-m architecture

Epochs: 50

Learning Rate: 0.003

Augments Performed:

random horizontal flips

small-scale translations

color jitter (HSV)

mosaic augmentation

mixup (light)

moderate scaling

Our Results

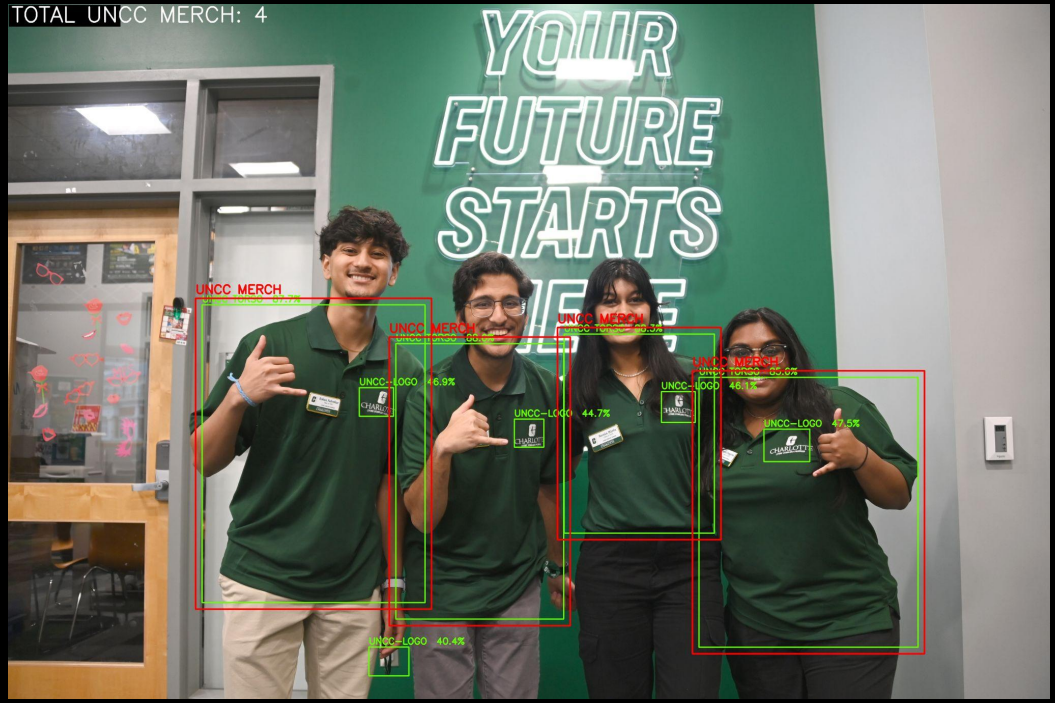
Overall
mAP50: 0.753
Precision: 0.854
Recall: 0.664

By Class

UNCC HEADGEAR
mAP50 = 0.622
Precision: 0.895
Recall: 0.500

UNCC TORSO
mAP50 = 0.932
Precision: 0.897
Recall: 0.850

UNCC-LOGO
mAP50 = 0.705
Precision: 0.769
Recall: 0.642



Precision (P) — “How often am I correct?”
Recall (R) — “How many real objects did I find?”
mAP@50 = “How well does the model find and correctly classify objects, assuming a moderately forgiving box overlap?”

Our Conclusion

Summary & Experience

Using our YOLO-based CV model, we can detect *UNCC merchandise* in **images** and in **videos**, useful for:

- Measuring engagement
- Event attendance
- School Spirit Meter

Limitations & Future Work

- Weak generalizability due to moderate dataset
- Expandable towards corporation employee identification

Q&A

OUR GITHUB REPO