



Multi Object Tracking and Segmentation

Presented By

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Introduction

Multi-object Tracking and Segmentation(**MOTS**) is a domain that still requires extensive research since the scores of the current models available are not sufficient for real-world driving. We aim to build an efficient model for solving the same problem statement in BDD100K challenge

CVPR 2023 BDD100K Challenges



We are hosting multi-object tracking (MOT) and segmentation (MOTS) challenges based on BDD100K, the largest open driving video dataset as part of the CVPR 2023 Workshop on Autonomous Driving (WAD).

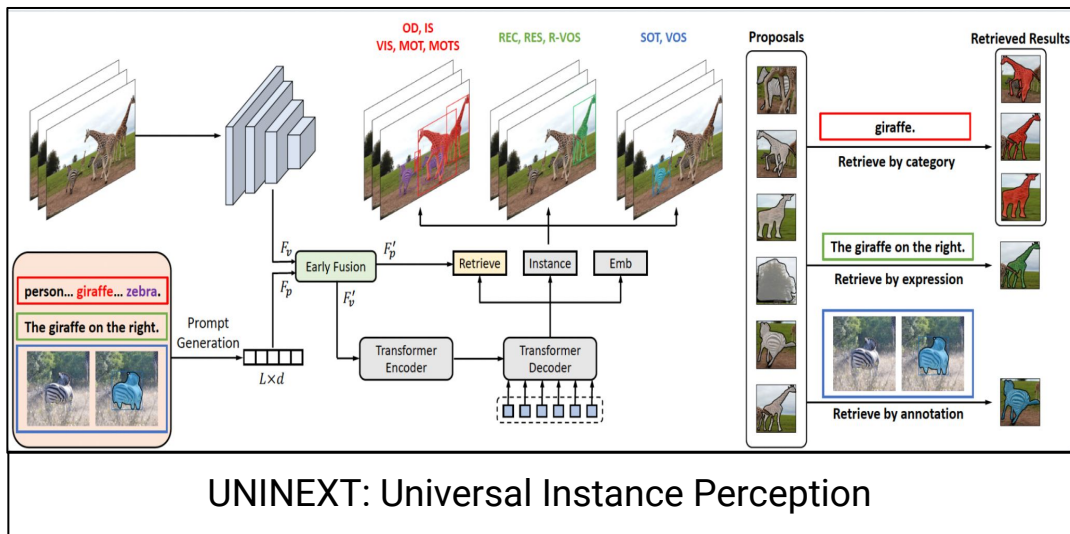
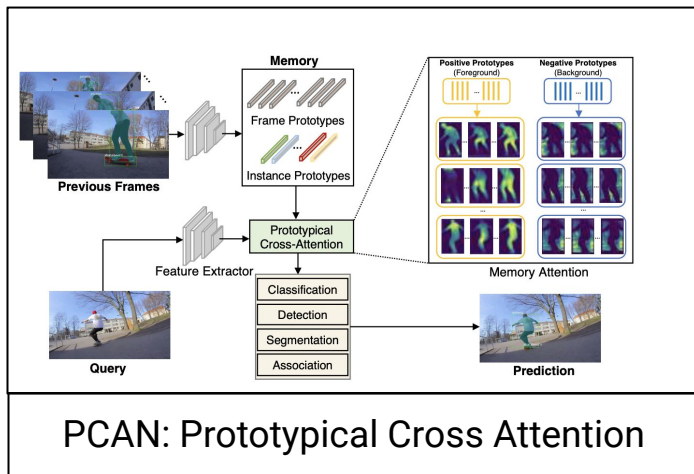
Goal Of Project

Aim: To develop an efficient multi-object tracking and segmentation network

1. Evaluate State of the Art on MOTs task (PCAN, UNINEXT)
2. To evaluate the YOLOv8 based modular tracking method
3. Develop MaskDINO based modular tracking module
4. To run inference of instance segmentation and tracking methods on BDD100K data

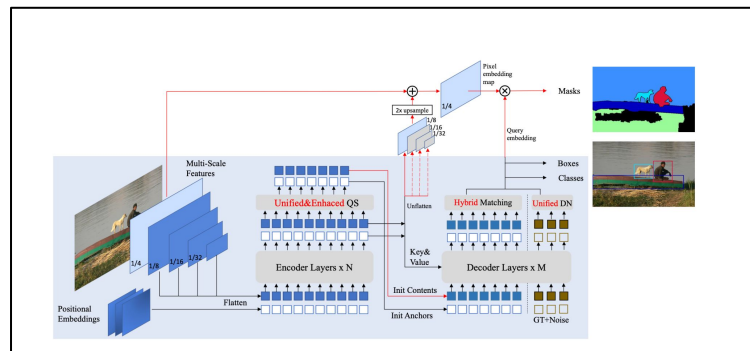
Method Type-1

Specialised Models

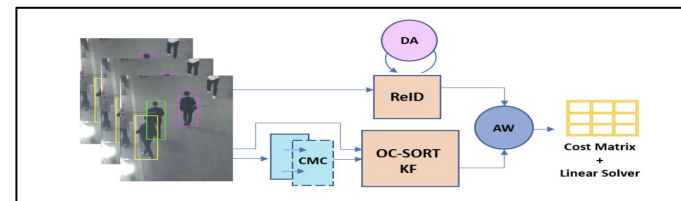


Method Type-2

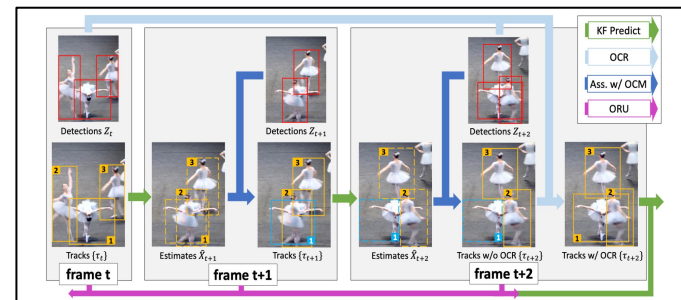
Best of Both Worlds(Seg+Track)



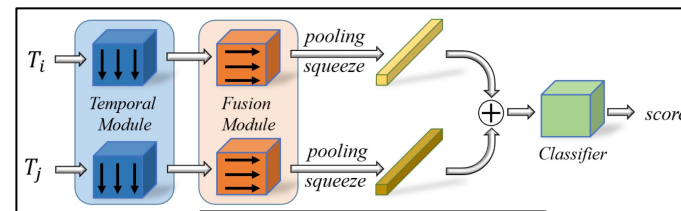
MaskDINO



Deep OC-SORT



OC-SORT



StrongSORT

Result

Overall Result			
Segmentation Metric	Tracking model	MOTSP	IDF1
PCAN		66.2%	44.8%
YOLOv8-segm*	DeepOC SORT	55.3%	37.6%
MaskDINO*	DeepOC SORT	60.4%	40.2%
	StrongSORT	58.7%	39.4%
	OCSORT	57.7%	35.3%

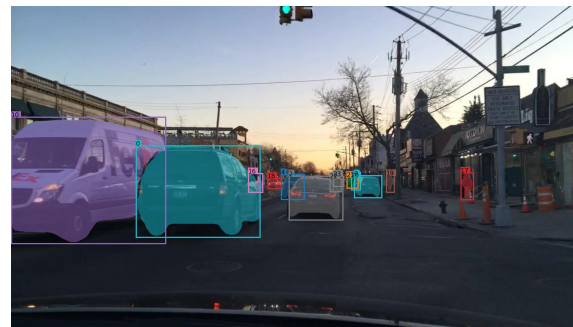
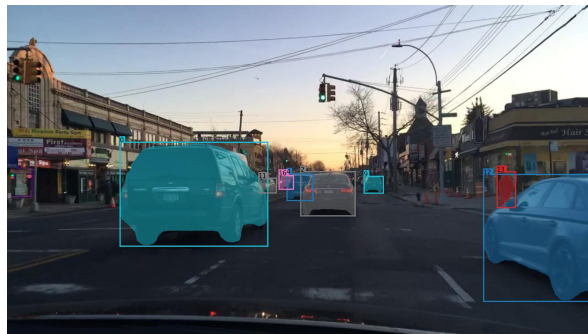
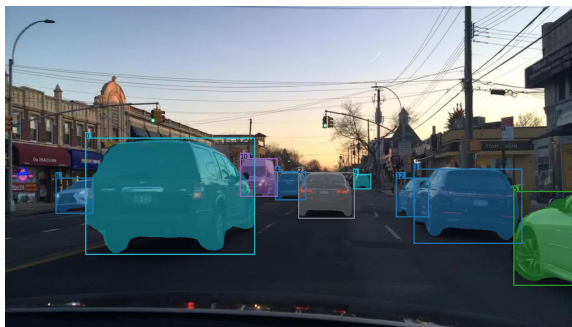
* Segmentation model does not have a "rider" class
 + Class "train" not present in validation data

Per Category Score				
Category	MaskDINO + DeepOC SORT		PCAN	
	MOTSP	IDF1	MOTSP	IDF1
Pedestrian	81.2%	44.0%	74.6%	45.8%
Rider*	0.0%	0.0%	73.5%	44.3%
Car	87.4%	77.8%	84.3%	73.2%
Truck	91.1%	58.8%	85.1%	55.6%
Bus	90.4%	60.6%	85.1%	62.2%
Train+	NaN	Nan	NaN	Nan
Motorcycle	51.9%	25.4%	50.8%	26.2%
Bicycle	82.1%	44.2%	75.8%	50.7%
Overall	60.4%	40.2%	66.2%	44.8%

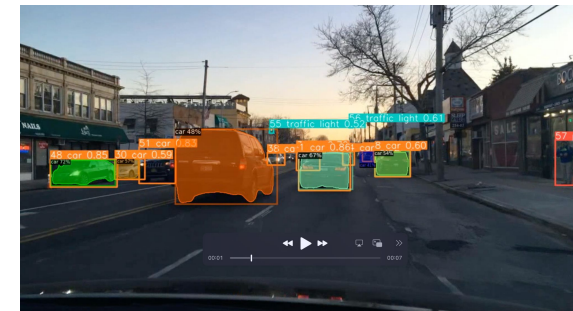
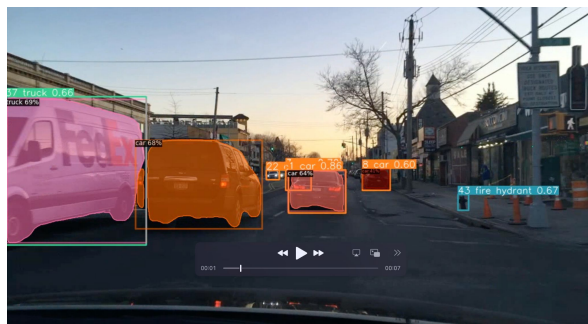
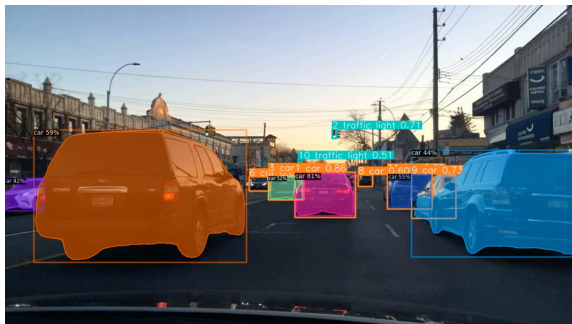
MOTSP: Multi Object Tracking and Segmentation Precision
 IDF1: ID tracking F1 score

Visualisations

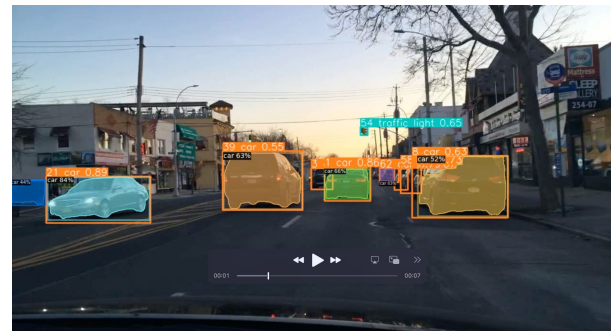
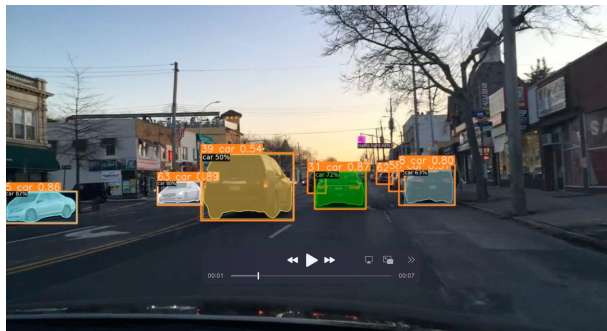
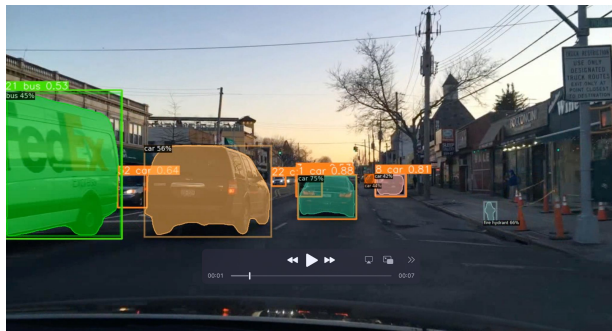
PCAN



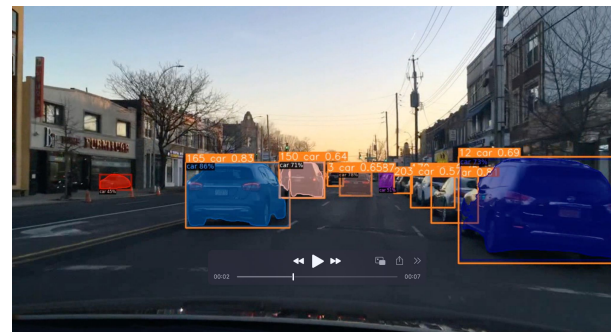
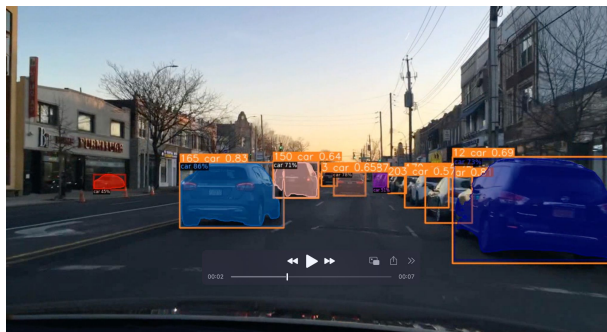
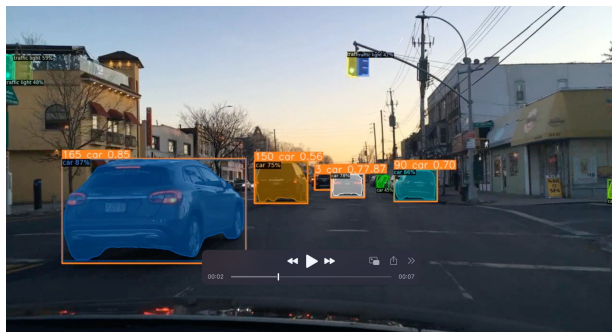
MaskDINO+ DeepOCSort



MaskDINO+ OCSort



MaskDINO+ StrongSort



Video Link :

https://drive.google.com/file/d/19wnIs3wUwLb7Nv6aer5NhKjXEDVIU9c4/view?usp=share_link

Future Work

- Our dataset has Rider class but MaskDINO does not have the same. We will include Rider as a separate class in MaskDINO. Our score is expected to automatically increase in that case.
- We are working to replace the appearance model in DeepOCSort by a transformer based model to detect even fine features during ReID.
- We will compare our method with unified model with UniNext and Unicorn.

Thank You!!