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PRE-ACT

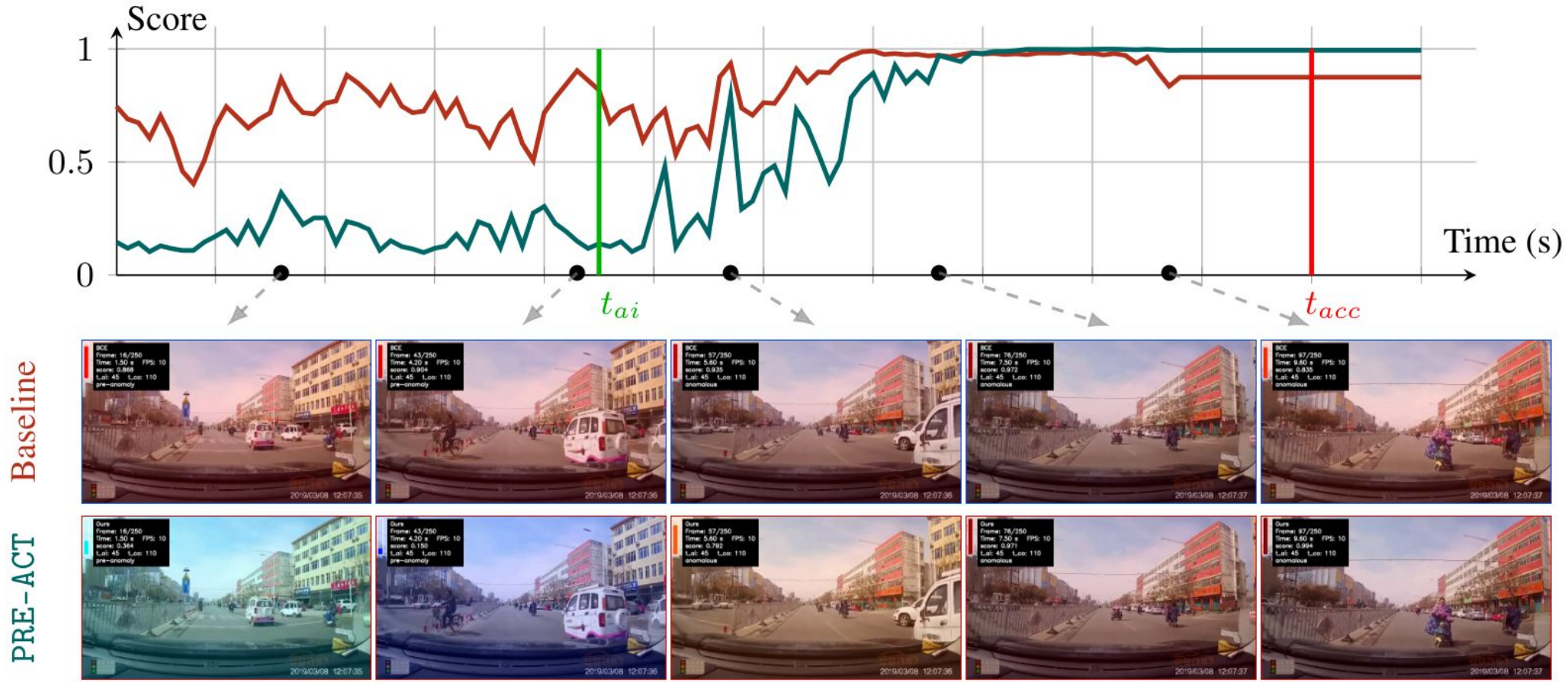
Progressive Risk Estimation for Accident Anticipation

Samet Hicsonmez[1*] Eray Çakar[2*] Nermin Samet[3†] Fatma Güney[2†]

[1] Independent Researcher, Paris, France
[2] Department of Computer Engineering, KUIS AI, Koç University, Istanbul, Türkiye
[3] Valeo.ai, Paris, France

* Equal contribution † Equal senior contribution

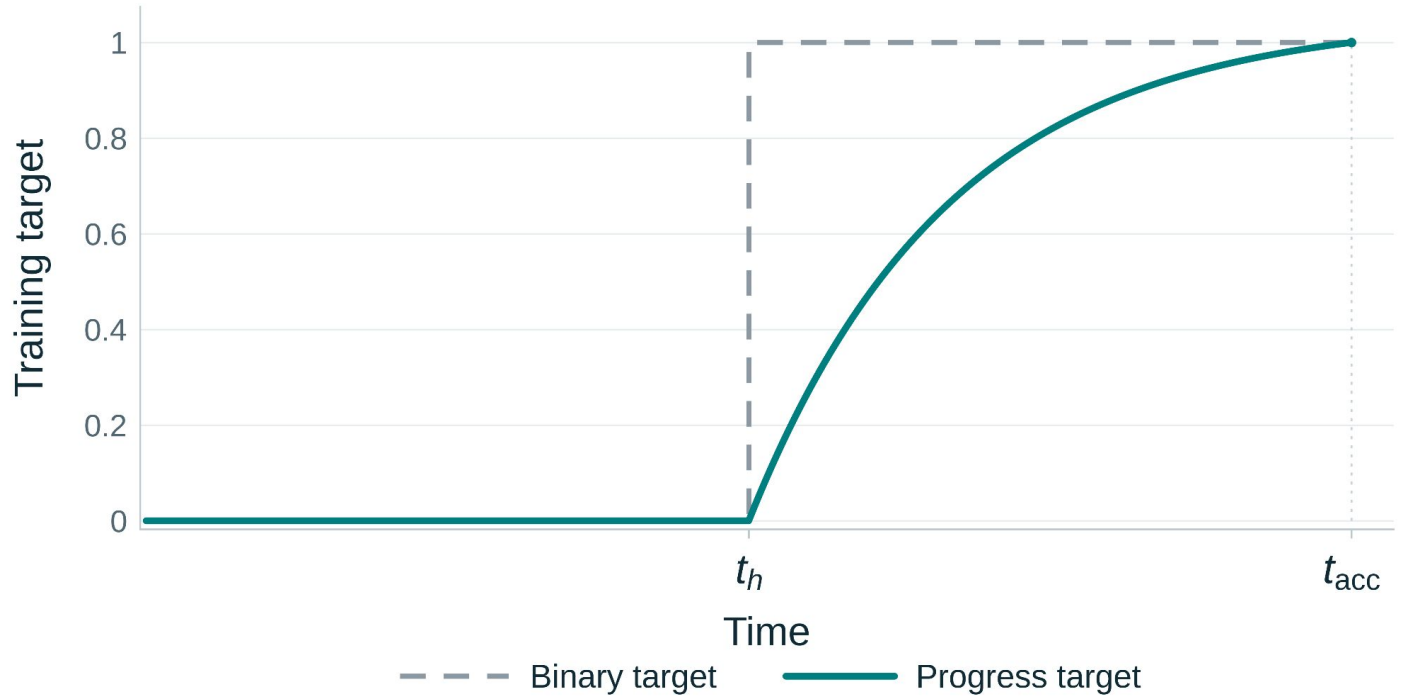
Accident Anticipation



Recognize danger before the collision, without triggering alarms throughout normal driving.

A continuous target for risk

The accident timestamp provides the supervision.

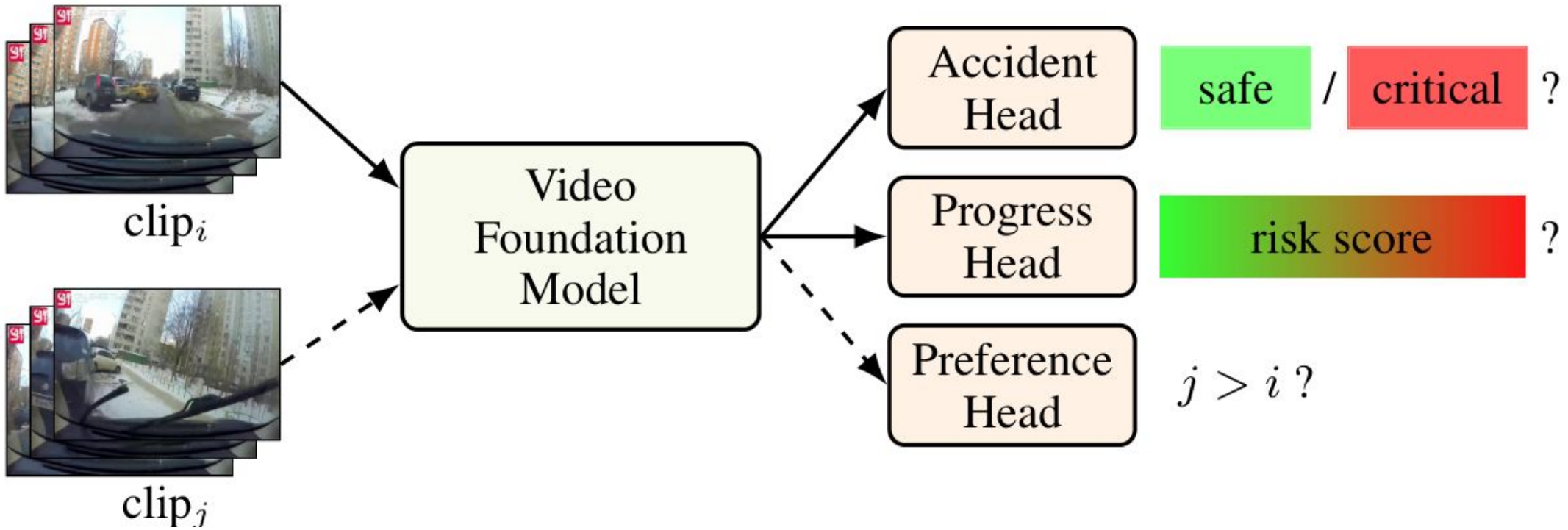


Zero during the safe-driving zone

Increasing toward the collision

Learning risk progression

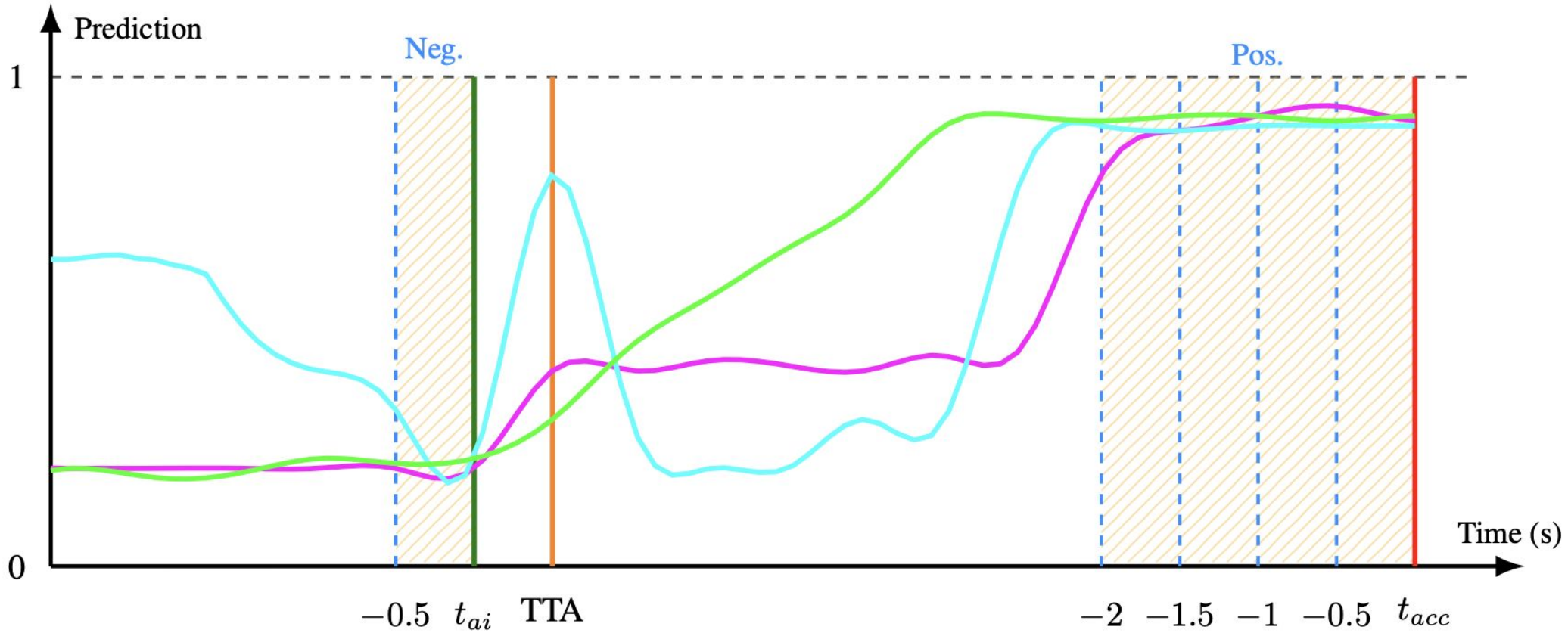
Five recent frames, encoded with VideoMAE



Comparison clip and ranking head: training only

Online inference uses a sliding window of past frames.

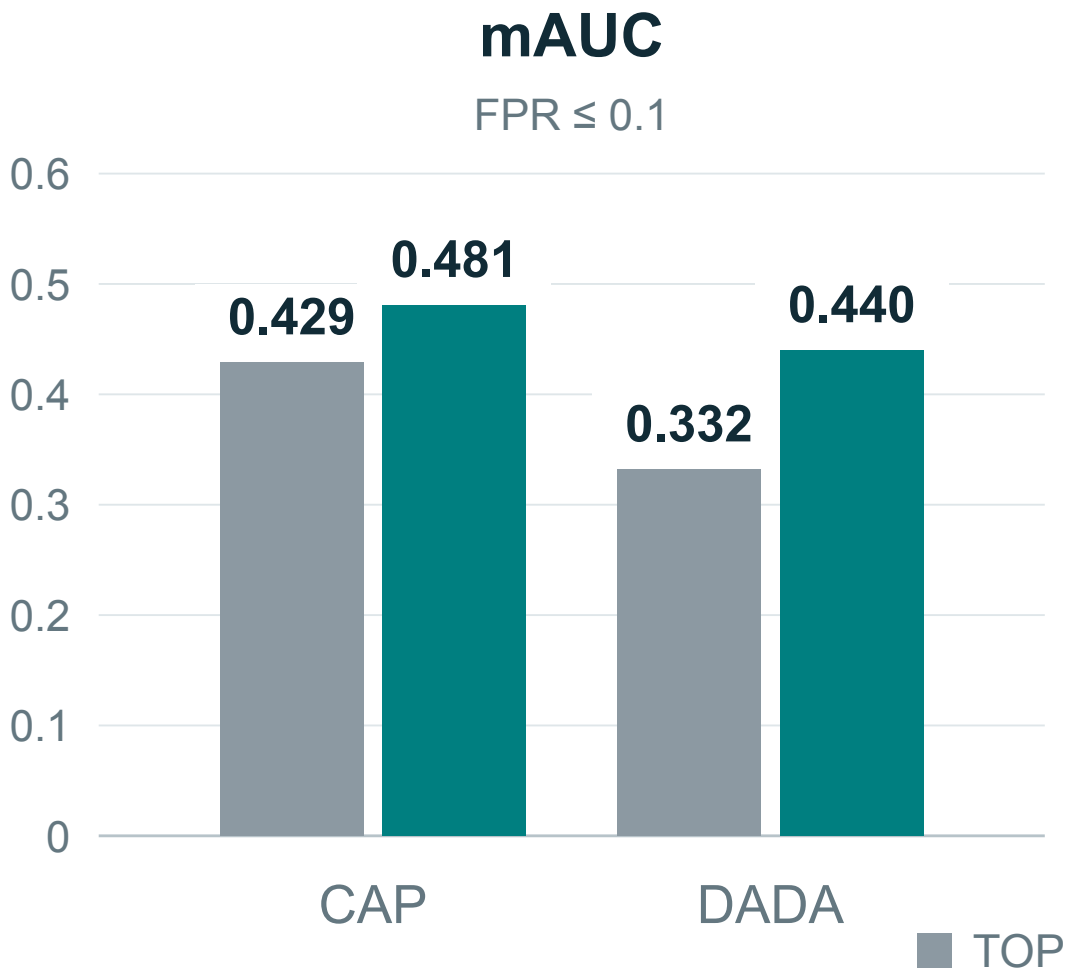
Separation Score



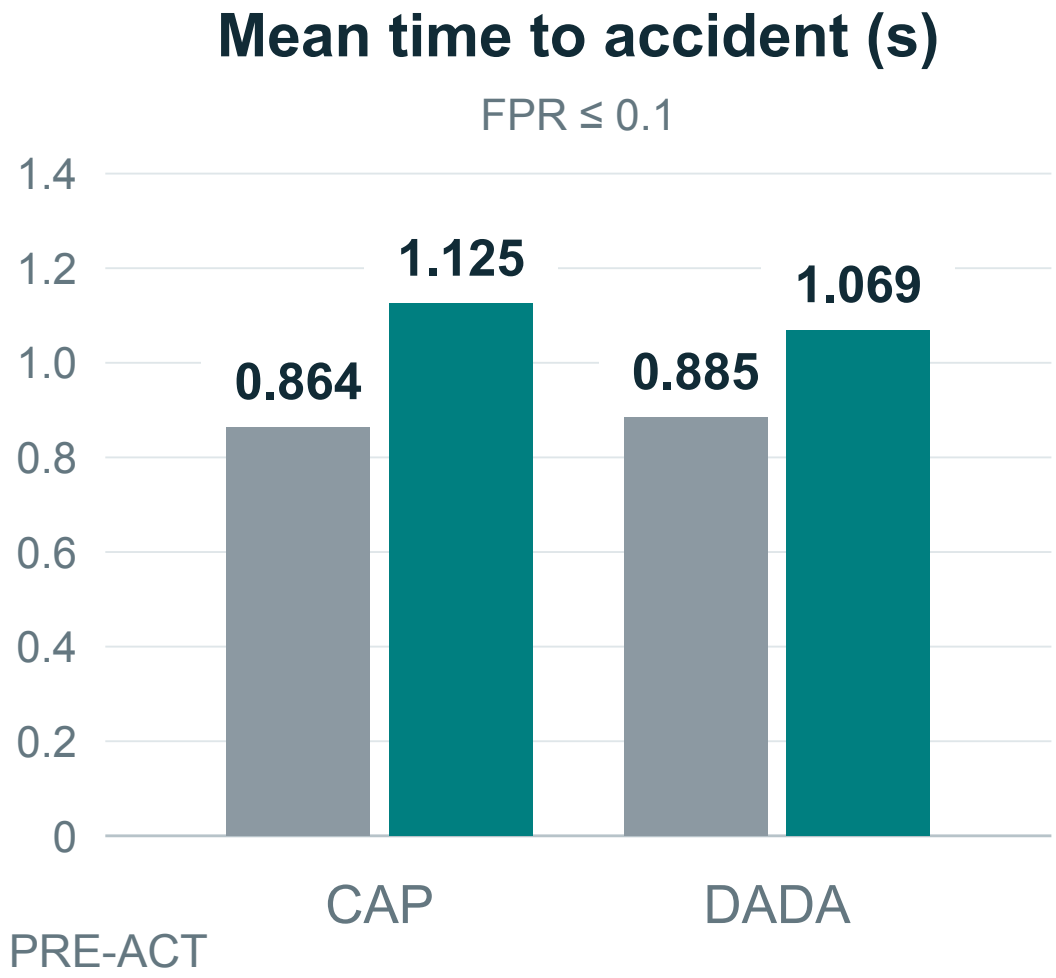
Current metrics focus only on selected windows.

Separation score considers the whole trajectory.

Stronger anticipation on CAP and DADA



CAP: 0.26 s earlier

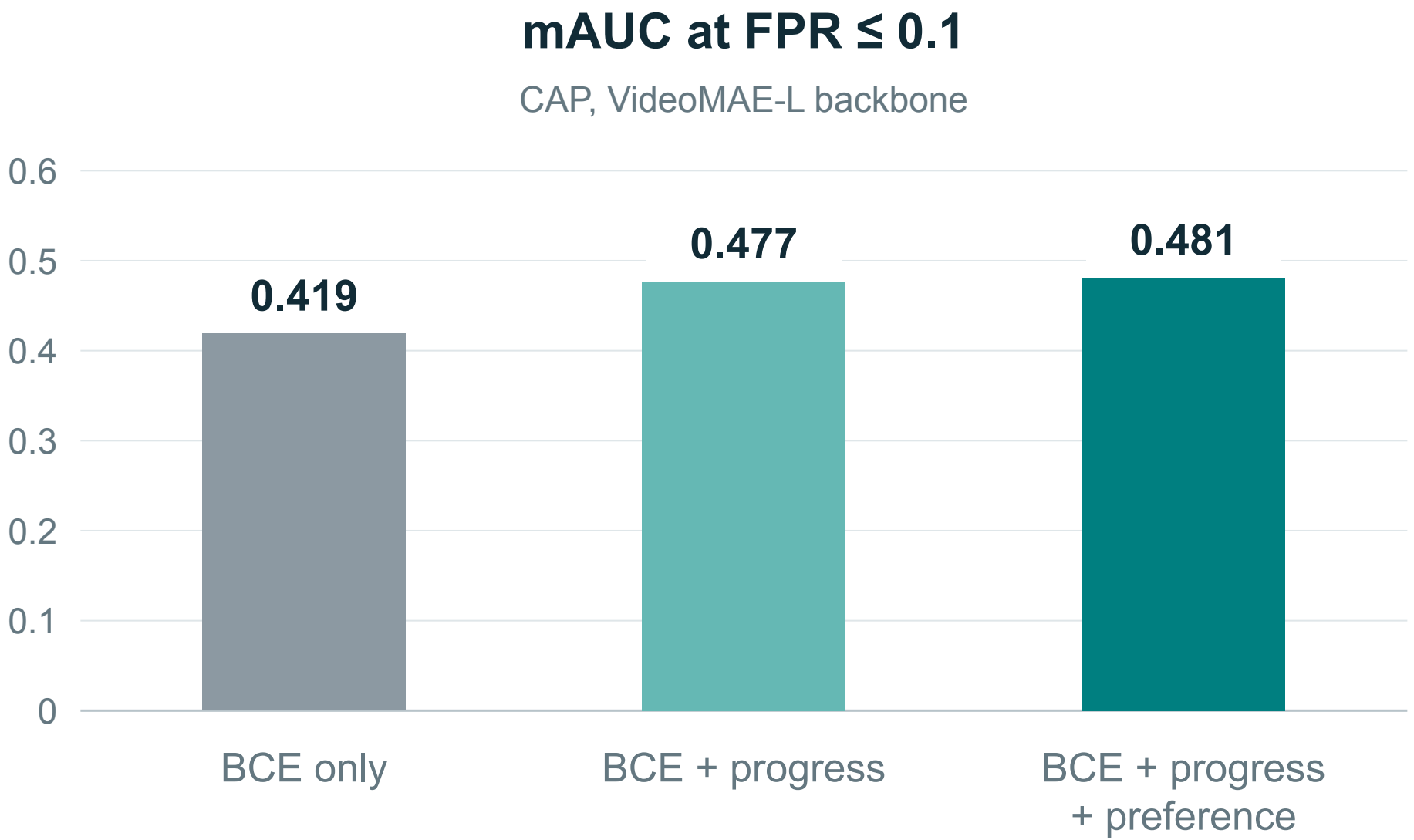


DADA: 0.18 s earlier

Nexar mAP: 0.895 (challenge winner: 0.885)

DAD mAP: 0.741 (current SoTA: 0.727)

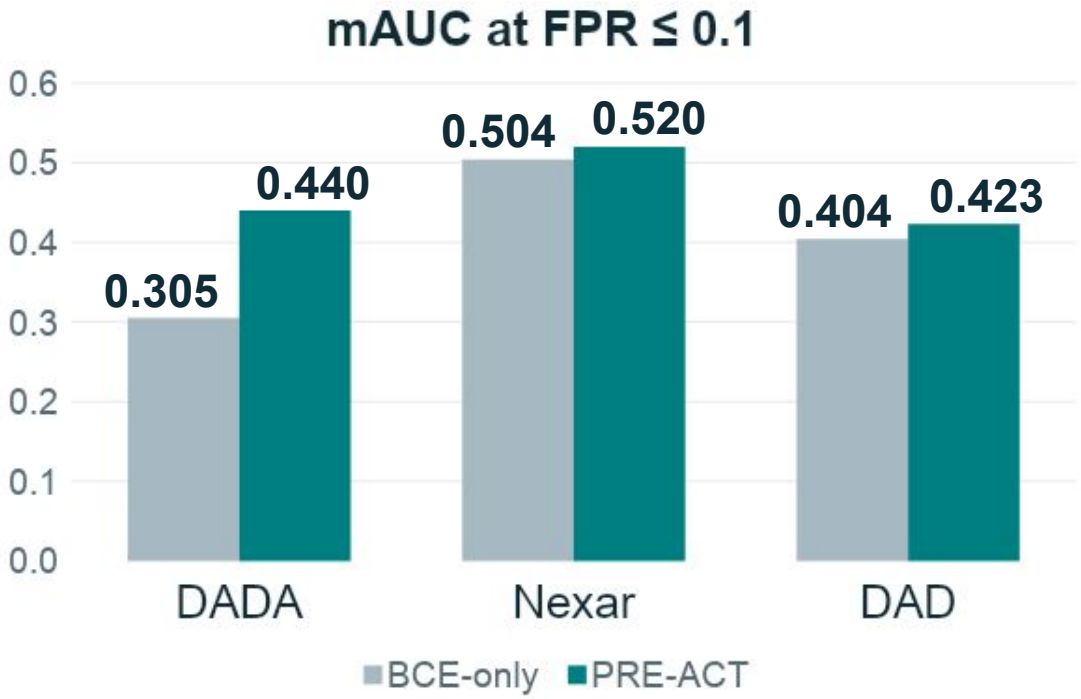
Progress Ablation

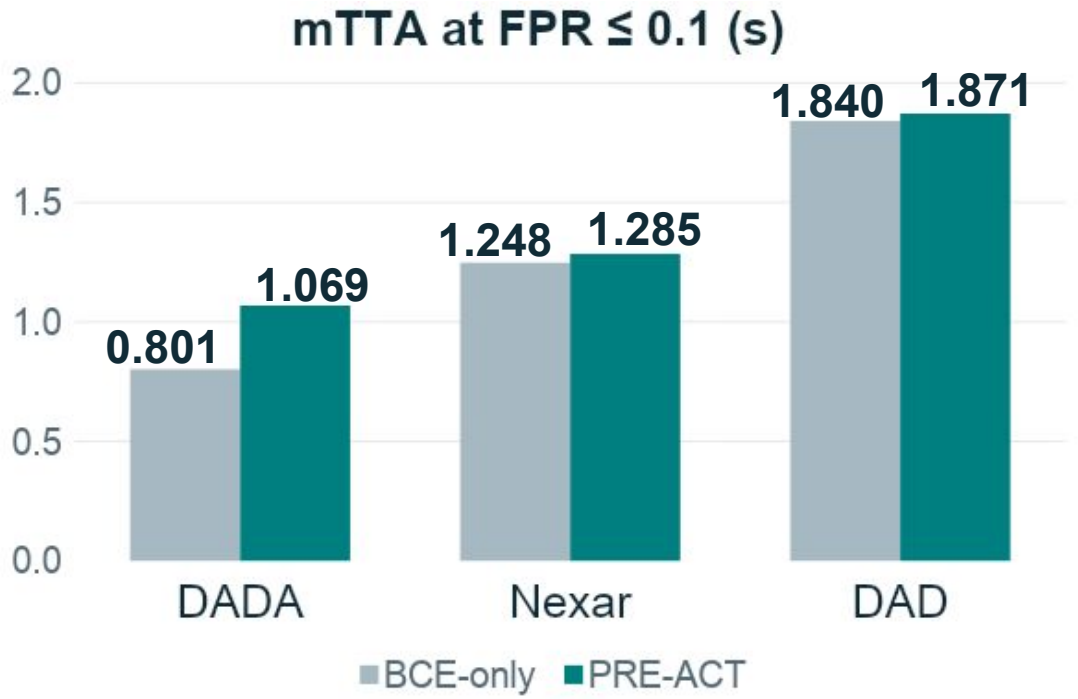


Progress adds almost 6 points on mAUC. Ranking adss a smaller gain.

PRE-ACT vs. BCE-only supervision

Matched training setup on DADA, Nexar and DAD





Higher mAUC on every dataset

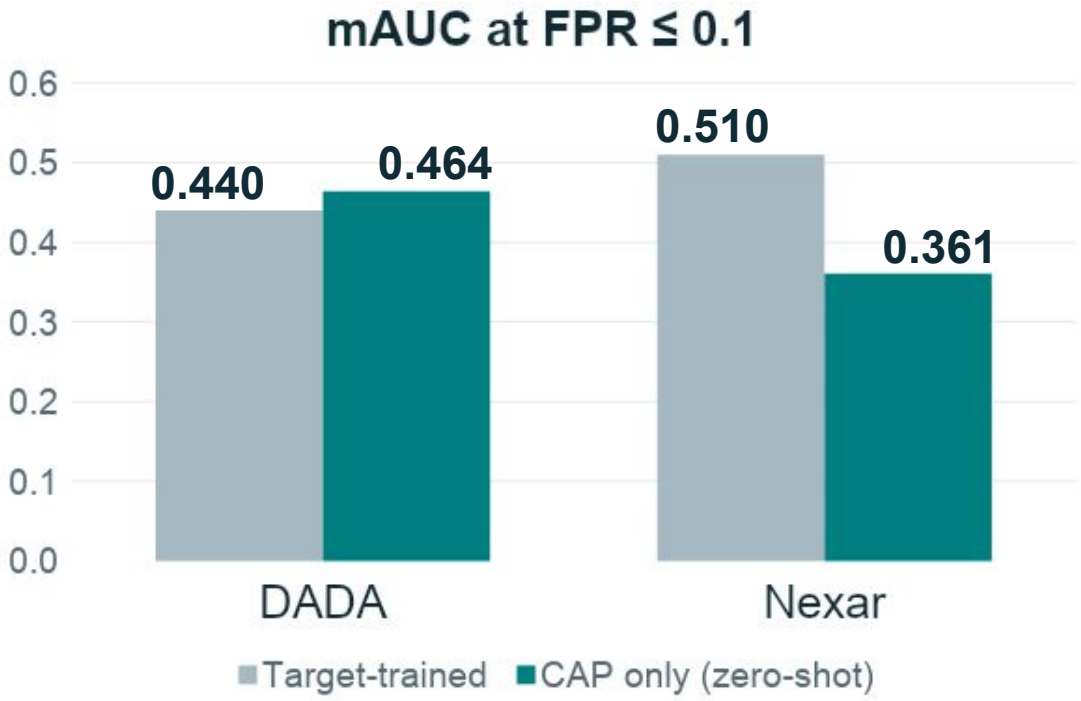
DADA +0.135, Nexar +0.016, DAD +0.019

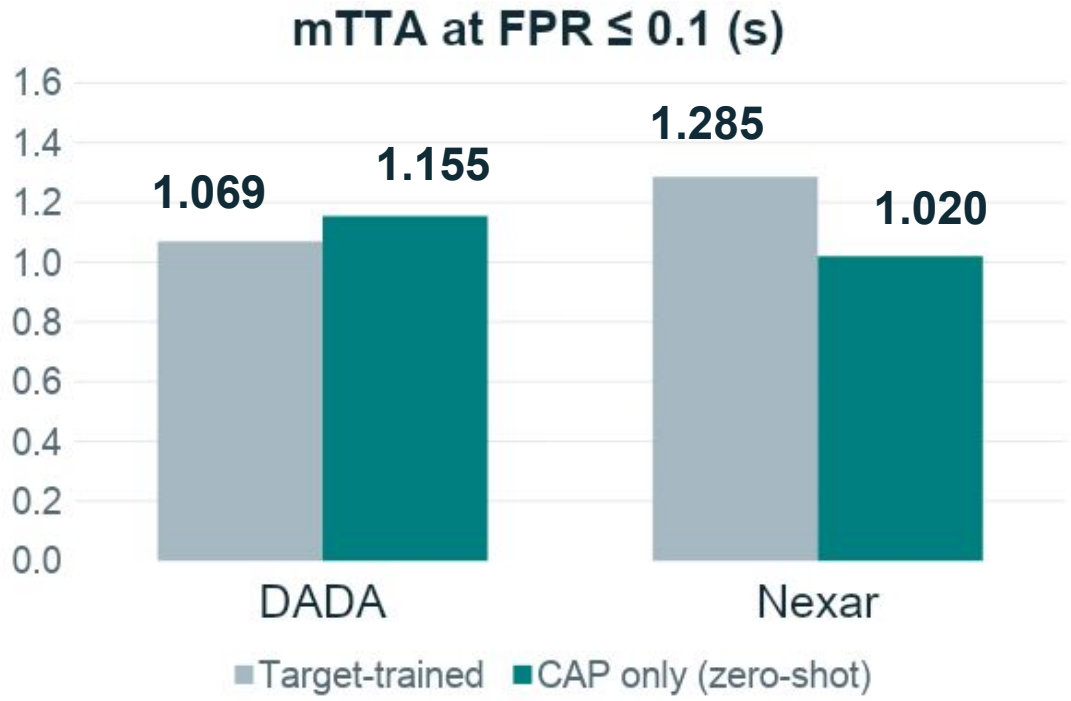
Earlier warnings on every dataset

DADA +0.268 s, Nexar +0.037 s, DAD +0.031 s

Cross-dataset generalization

Train on CAP. Evaluate on DADA and Nexar without fine-tuning.





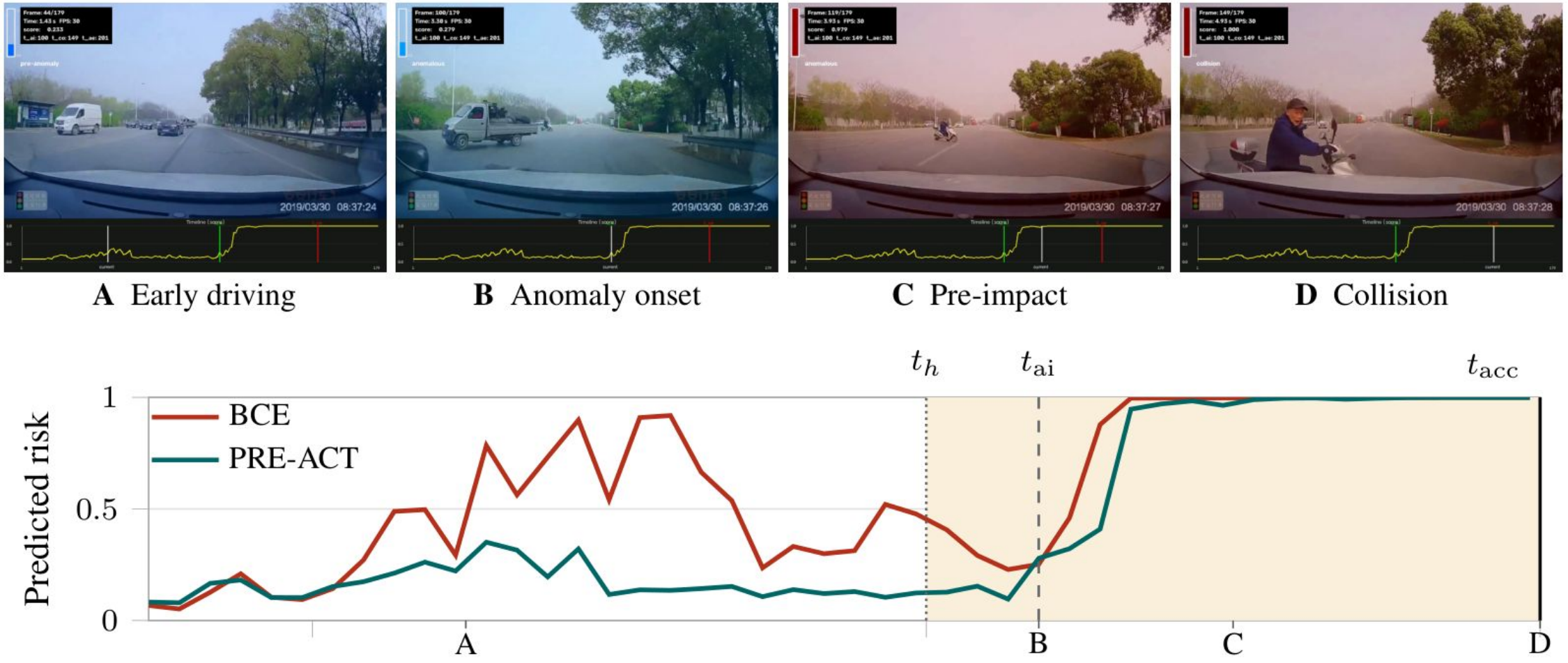
DADA improves without fine-tuning

mAUC +0.024, mTTA +0.086 s

Nexar shows a larger domain gap

mAUC −0.149, mTTA −0.265 s

Visual Comparison



Learning how risk develops improves anticipation

Continuous risk supervision improves binary formulation.

Generalization across driving conditions remains open.

Code and pretrained models

github.com/giddyyupp/PRE-ACT

