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ACTIVE: TOWARDS HIGHLY TRANSFERABLE 3D PHYSICAL CAMOUFLAGE FOR UNIVERSAL AND ROBUST VEHICLE EVASION

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Key Contributions

Innovative Instance-Agnostic Texture Rendering

We pioneer the use of **Triplanar Mapping** with our **Neural Texture Renderer (NTR)** to create *universal* adversarial textures, *eliminating* the need for *specific UV mapping* constraints and ensuring *compatibility* with *any 3D vehicle*.

Stealth Loss for Enhanced Concealment

We employ our unique **Stealth Loss**, which not only misclassifies the target vehicle but also *renders it undetectable* by minimizing detection scores *across all valid regions* regardless of class.

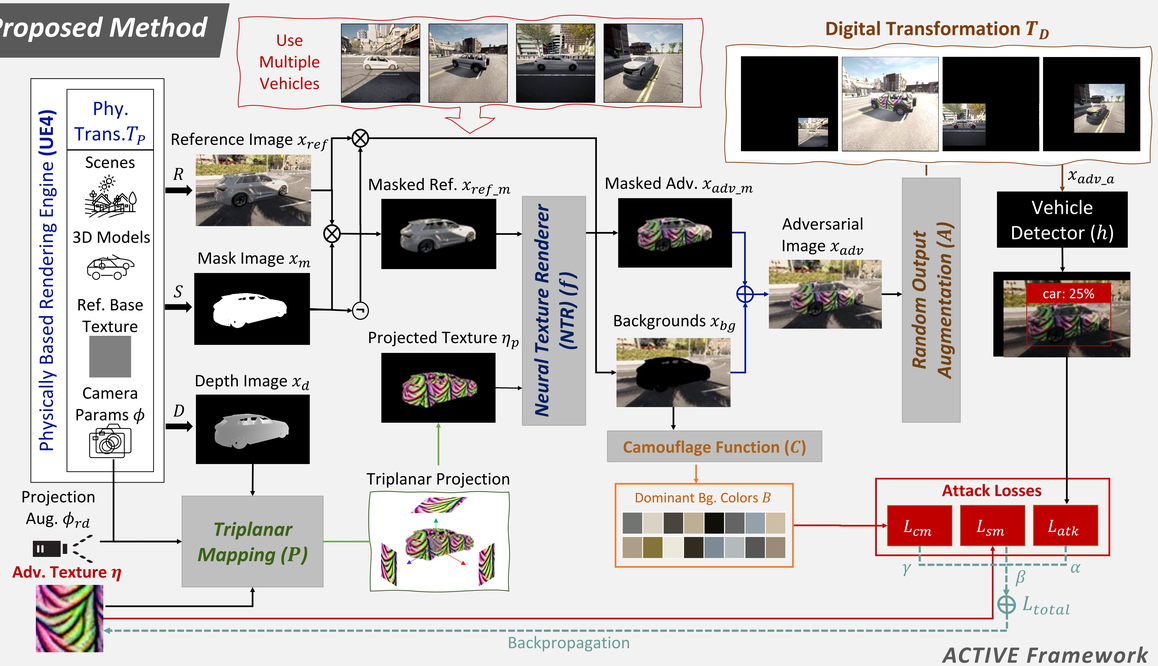
Advancements in Naturalness

We enhance the *naturalness* of adversarial camouflage by *larger texture resolutions*, applying a *Smooth Loss*, and introducing a **Camouflage Loss** for better vehicle *concealment against the background*.

Universality in multiple aspects

We outperforms prior works in **extensive experiments**, demonstrating enhanced universality *across diverse perspectives*: instance-agnostic, class-agnostic, model-agnostic, task-agnostic, and domain-agnostic.

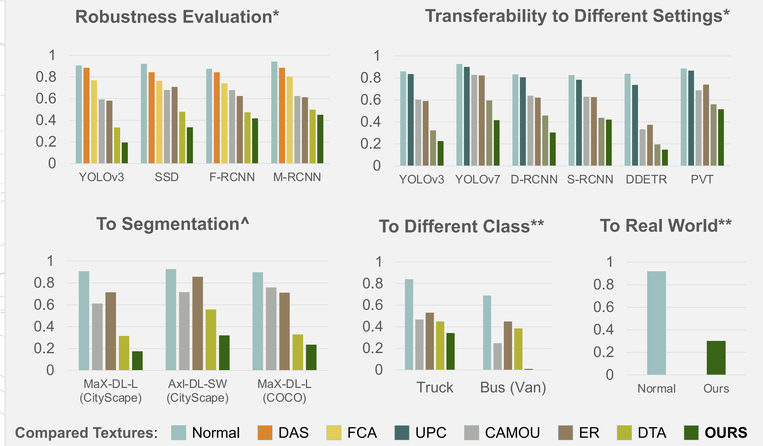
Proposed Method



ACTIVE Framework

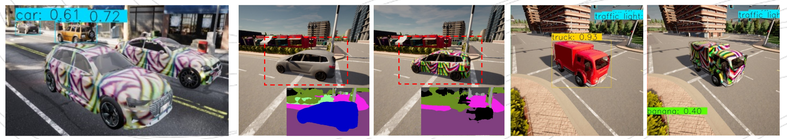
Evaluation Results

*Car AP@0.5 ^Car Pixel Accuracy **Car AP@0.5 Averaged



Evaluation Samples

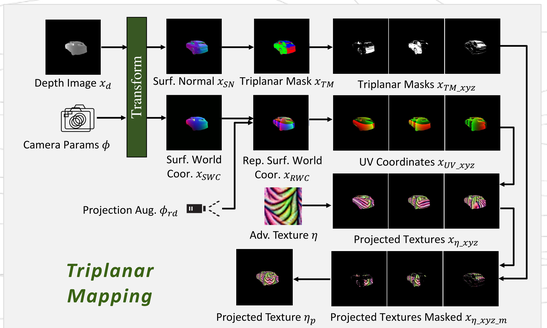
Our Natural Sample · Segmentation Sample · Different Class Sample



Real-world Evaluation Samples

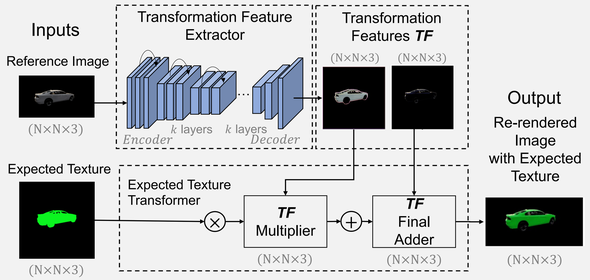
Scan for details!

https://islab-ai.github.io/active-iccv2023/



Triplanar Mapping

Neural Texture Renderer(NTR)



Stealth Loss

$$h_d(x) = \begin{cases} h_c(x) \times h_o(x), & \text{if } IoU(h_b(x), gt) > t \\ 0, & \text{otherwise} \end{cases}$$

$$L_{atk}(x) = f_{log}(\max(h_d(x)))$$

Smooth Loss

$$L_{sm}(\eta) = \frac{1}{N_{sm}} \sum_{i,j} f_{log}(|\eta_{i,j} - \eta_{i+1,j}|) + f_{log}(|\eta_{i,j} - \eta_{i,j+1}|)$$

Camouflage Loss

$$L_{cm}(\eta, B) = \frac{1}{N_{cm}} \sum_{i,j} f_{log}(\min_{b \in B} |b - \eta_{i,j}|)$$