Visual M.L. System for Identifying and Minimizing Civilian Fatality in Urban War Zones

Project Proposal

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Problem Statement

Incr

Incr

Hum

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The Atlantic

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The Lives Changed Forever When Flight MH17 Was Shot Down

As the trial of those accused of destroying a passenger plane over Ukraine in 2014 concludes, the O'Briens are still mourning their son, Jack.

By Timothy McLaughlin

Our project

Image classifier of military vs civilian vehicles

- Trucks
- Tanks
- Cars
- Aircraft
- Boats
- Drones

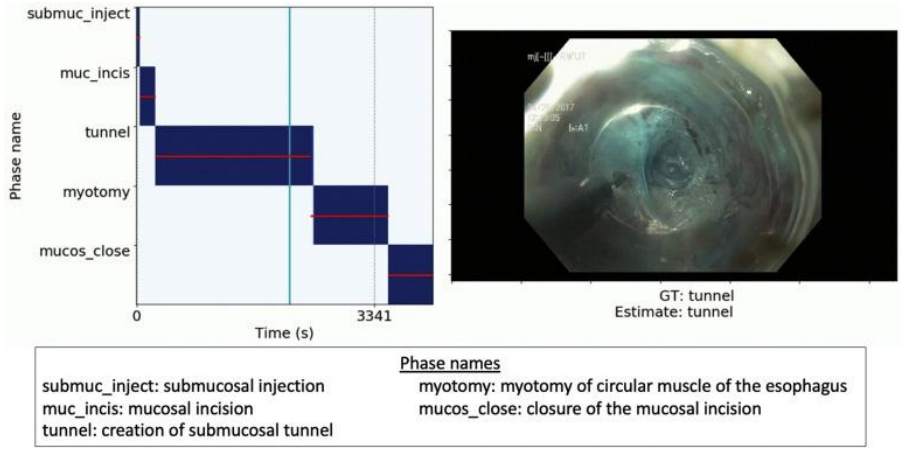
At first: image

Later: video

Photo credits: NPR www.npr.org/2022/04/25/1094588767/u-s-promises-new-aid-to-ukraine-in-fight-against-russia

Existing Technology

- Computer Vision Obscuration
- Acoustic Pattern Identification
- Medical Analysis



	Robust-Dpatch[a]	Imperceptible Patch (ours)
Generated Patch		
Image augmented with Patch		
Faster R-CNN prediction for image augmented with patch		

https://github.com/chriswise07/imperceptible-patch-generator

https://arxiv.org/abs/2202.08892

Development

Method and Data

TensorFlow

One dataset with **cars**,
one with **military and civilian vehicles**

Training on **large data set.** Packaged as a model and integrated into **Jupyter Notebook**

GitHub Actions Workflow to lint code

Evaluation

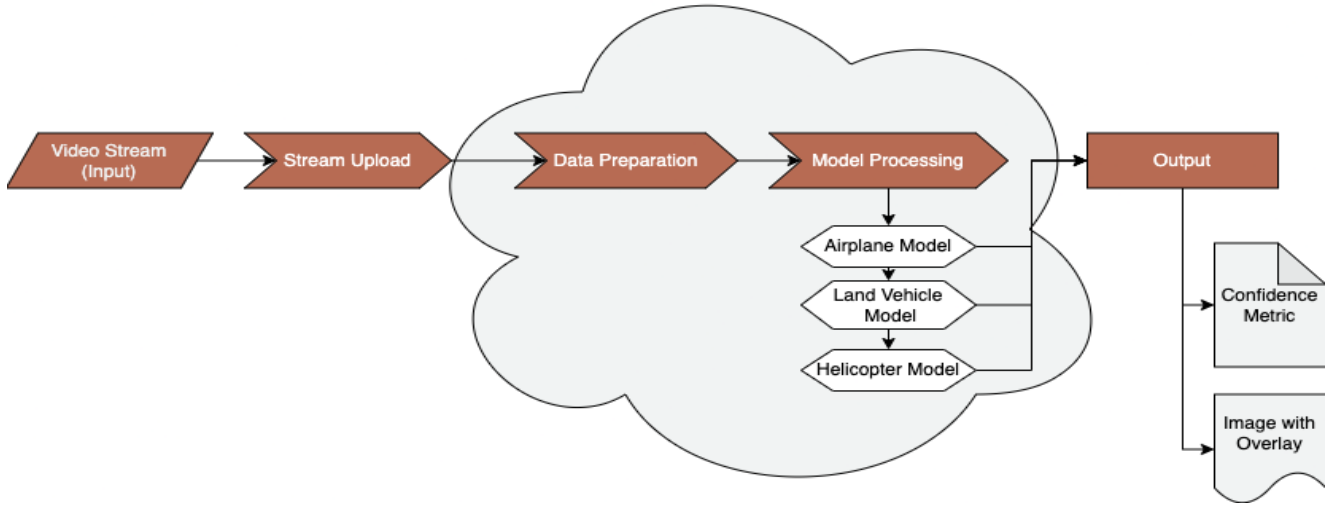
Quantitative test by **running test–script with a large amount of images**

Qualitative test by verifying identification using **generated overlays**

Analyze and **present visually** through graphs

Proposed M.L. System Architecture

- Data collection is done **on device** with some initial sanity assertions.
- Data preparation and model processing is conducted in the **cloud** or on a **centralized system**
- Prioritizes computational power over deployment flexibility (i.e. devices that can stream video but cannot process)



Limitations / Hardships

Time

Money

Training data

- Secrecy around military designs
- Vehicles around the world

Strategies to avoid detection

- Civilian vehicles as shields
- Design changes