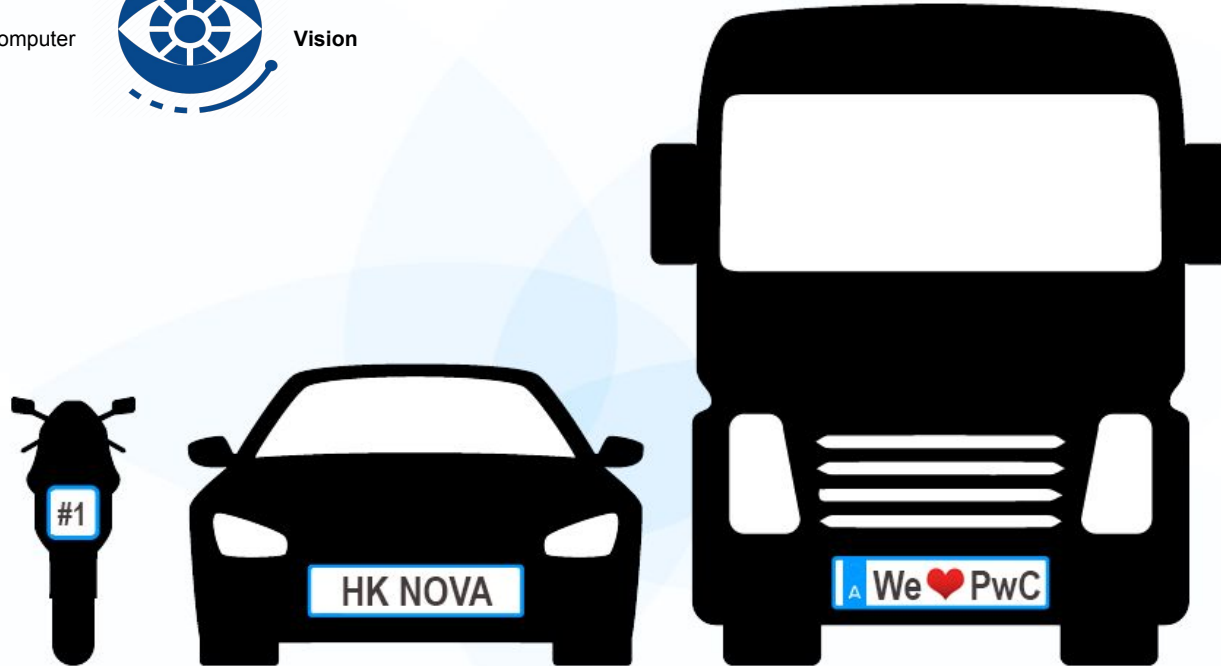


# PwC Data-Lympics

## Challenge # 1



# What's to come...

1. Introduction
2. Team Members
3. Challenge # 1
  - a. Problem Statement
  - b. Proposed Solution
  - c. Outcome
  - d. Visualization
4. Failures
5. Key Learnings
6. Business Case and Application
7. Future Work





# HK Nova Team Members...

Terence Leung



Bikram Gangwar



Rohini Banerjee



Abhishek Paryani

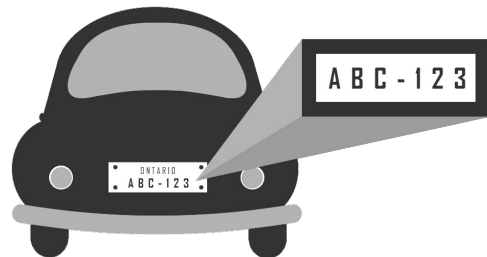


We are a team from  
**HKUST**

# Challenge # 1: Computer Vision

## Problem Statement

- With the **input** source as video, analyze the frames and detect number plates.
- Store these number plates digitally and export them into a db (CSV in our case)
- Email this CSV



# Proposed Solution

- Yolo V2
- DarkNet 19
- PYTHON

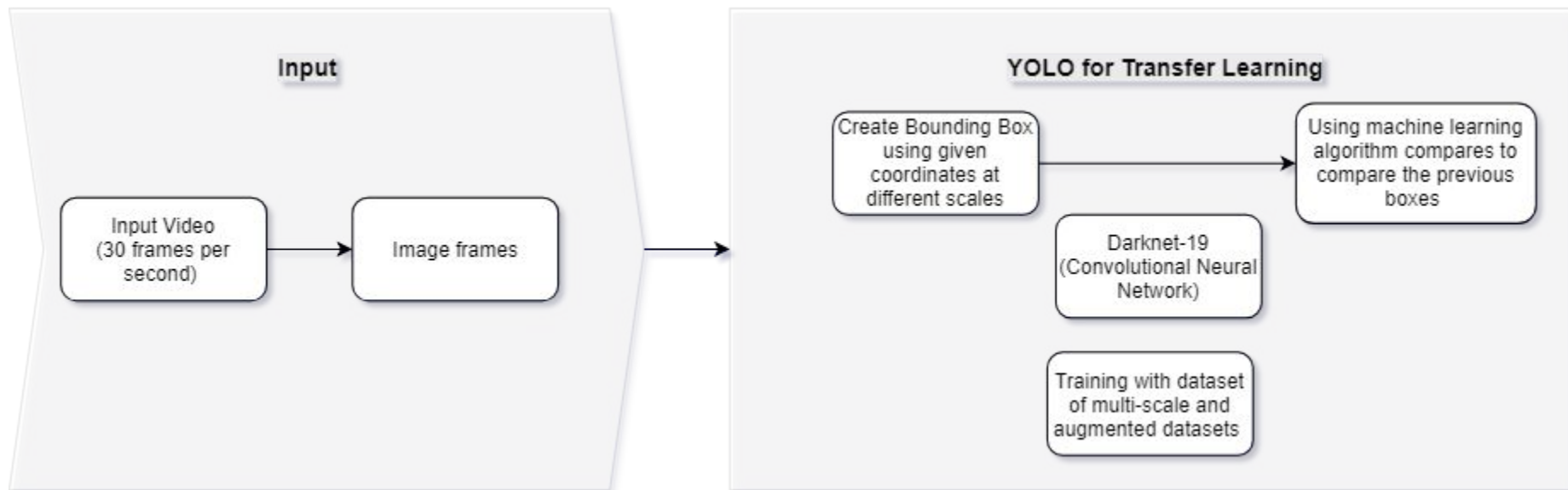


# Outcome

1. CSV with timestamp, number plate and total count
2. Output videos with bounding boxes
3. Our Algorithm developed using YOLOV2 and custom feature-engineering
4. Readme explaining outcome

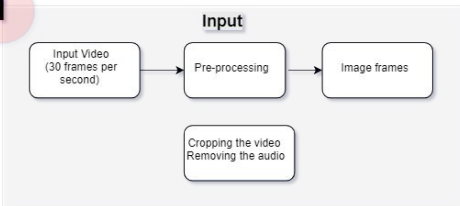


# YOLOV2 Architecture

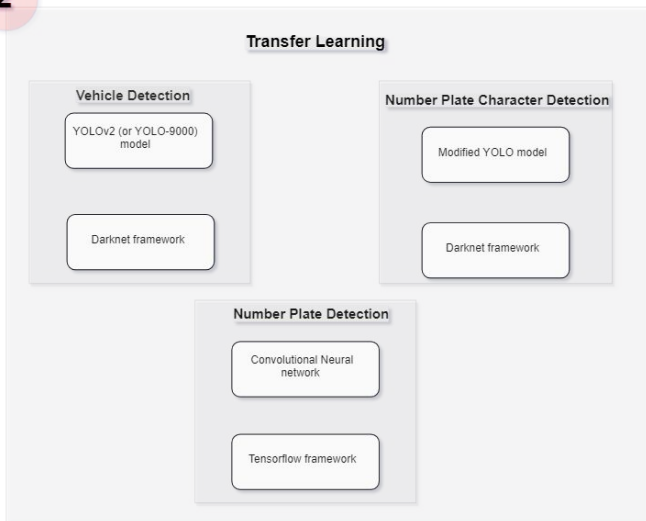


# Proposed Solution: Architecture

1



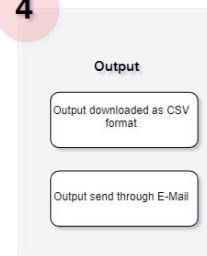
2



3



4





# Outcome



# YoloV2 + DarkNet: Pros and Cons



## Pros

- Faster than similar pre-trained models
- Accuracy of 80-95%
- Avoids false positive detection

## Cons

- Problems with detecting small blurry objects
- Annotated only 200 datasets



# Failures...Part of Life :)

## Ideas and Models that failed :(

- Cropping the image
- Grayscaleing the image (canny)
- Tesseract
- RPNET (PYTORCH)



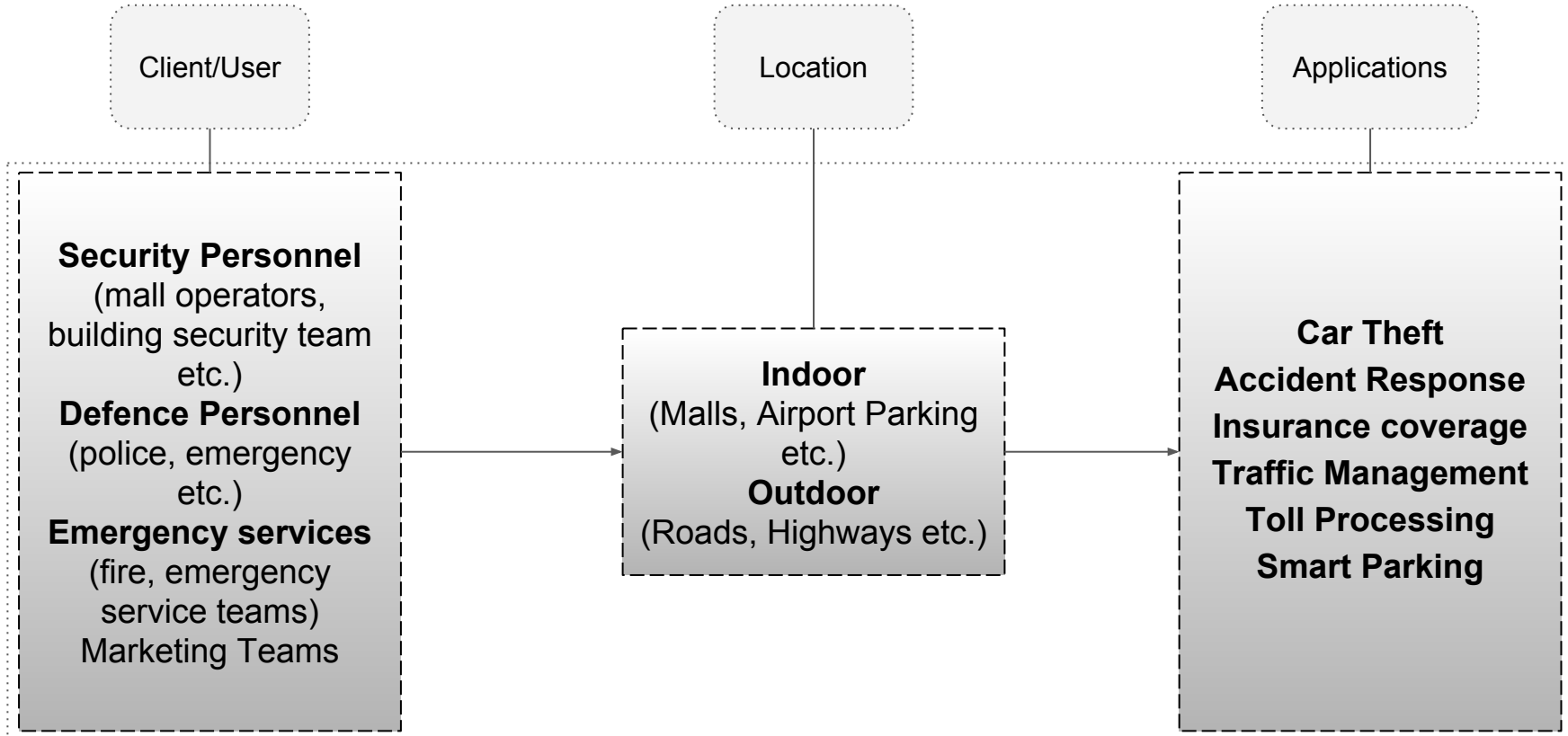
# Limitations of our model...

Given the time constraints:

1. Model spits out duplicate entries for vehicles detected
2. Reflective surfaces confuse the model
3. Two number plates in the same vehicle : picks it as one
4. Languages other than English are NOT detected by the model



# Proposed Solution: Generic Applications



# Proposed Solution: Specific Application to Risk Assurance



Vehicle/License  
Fraud

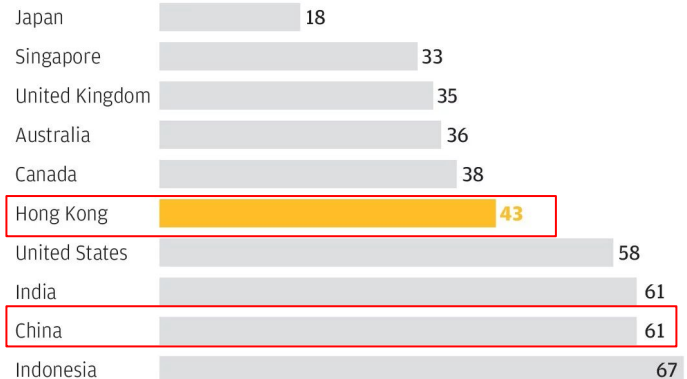
Credit Card Fraud

Currency Fraud

# Proposed Solution: Cyber Crime and Credit Card Fraud

## Global impact of cybercrime

*The percentage of internet users who were victims of online crimes from October 2016 to September 2017*



Source: Symantec

SCMP

| Chargeback rates by country | 2016  |
|-----------------------------|-------|
| Brazil                      | 3.55% |
| Mexico                      | 2.82% |
| Russia                      | 0.82% |
| France                      | 0.65% |
| Germany                     | 0.54% |
| Belgium                     | 0.54% |
| United Kingdom              | 0.51% |
| United States               | 0.47% |
| Netherlands                 | 0.40% |
| Spain                       | 0.24% |
| China                       | 0.18% |
| Japan                       | 0.18% |

# Future Work

1. By using a combination of Fast RCNN and YOLOV3 to avoid false positives
2. Train the model with more images with false positives
3. Train the model with annotated images of license plates
4. Plot a live graph of objects detected (matplotlib lib)
5. iOS and Android App for real-time analysis for other applications mentioned above





# Questions & Feedback

