



ViShield

Protects you from unwanted images/videos

The INTERNET



IMAGES

VIDEOS

TEXT

Phobia Triggers

A phobia is an anxiety disorder defined by a persistent and excessive fear of an object or situation

Fear of amphibians



Fear of clowns



Fear of insects

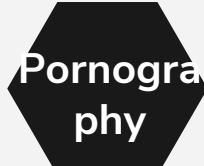


Fear of spiders



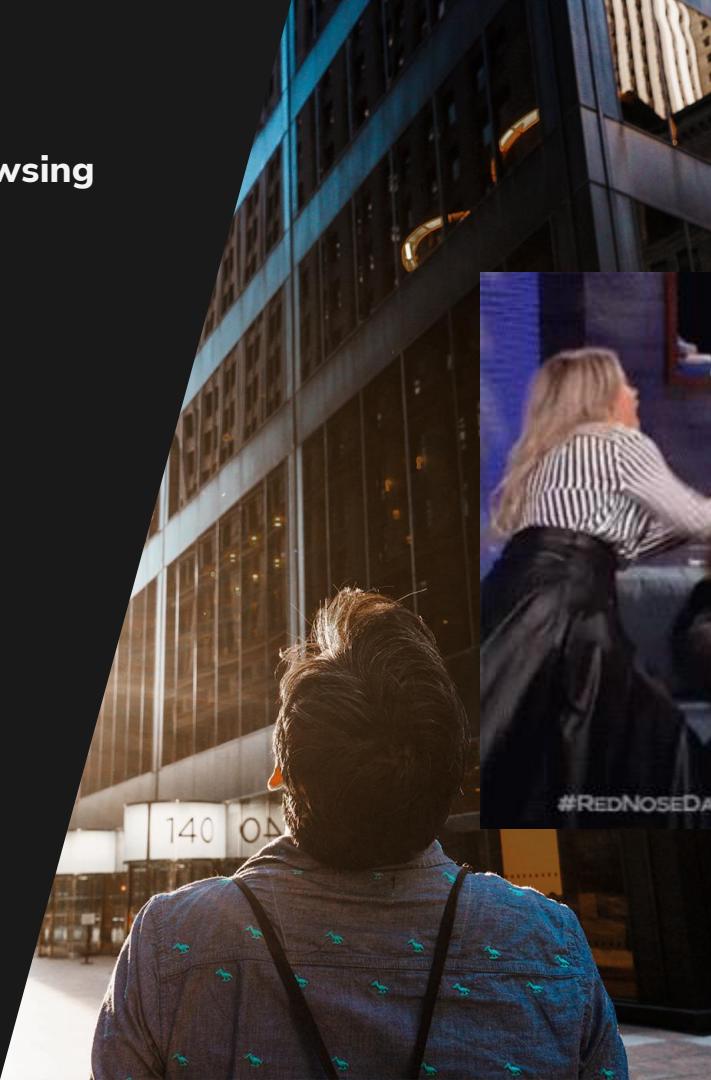
Fear of dogs

Societal Issues



IMAGINE
you are browsing
the internet

Trigger Warning!



Snakes



Symptoms / Effects

Short term

- Sweating
- Chills
- Shortness of breath
- Nausea
- Headaches
- Numbness
- Confusion or disorientation
- Loss of appetite



Long Term

- Constant Anxiety
- Panic Attack
- Suicidal (Hate Speech)
- Change in Character & Values (Violence and pornography)

Current Solution: URL Blacklist

Government Blacklist

THE STRAIT TIMES TECH LOG IN NS

FOR SUBSCRIBERS

53 piracy websites blocked in battle to curb copyright breach



The Pirate Bay

Pirate Search

All Audio Video Applications Games Other

Pirate Search I'm Feeling Lucky

How do I download?

TPB Proxy Bay | About | Blog | Usage policy | Cookies

BTCoin: 1M9rxZPWz3PQHmAYWxaz21Bw4kAWJahbk
Bitcoin: [Proxy Servers] 193VxLjXc187AS5t259Hrvc5L5enXb

The Pirate Bay and SolarMovie.sc are two out of the 53 piracy websites that have been blocked in Singapore. PHOTOS: THE PIRATE BAY, SOLARMOVIE



Open Sourced / Custom URL Hostlist

Block List

Block site permanently or by schedule

Type Something

twitter.com

facebook.com

netflix.com

instagram.com

wish.com

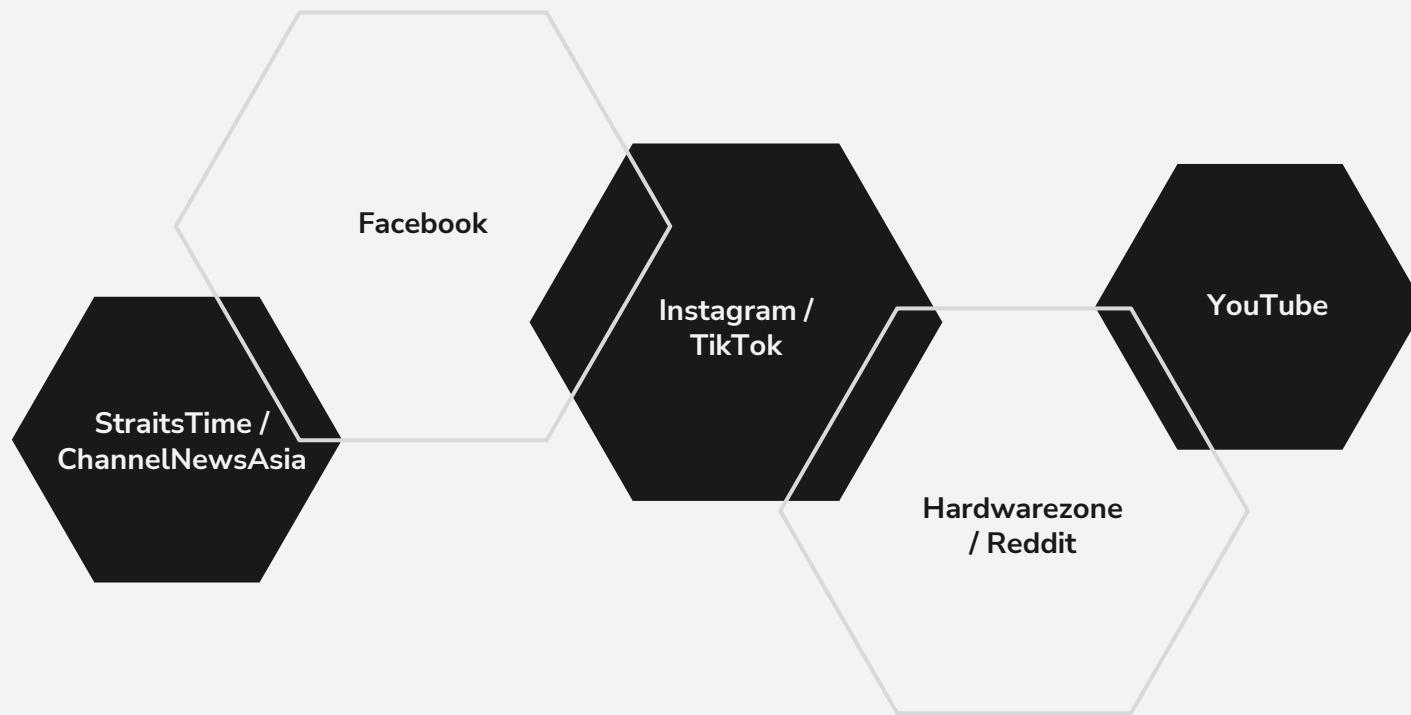
cnn.com

Custom lists

If time-wasting distract you and is needed

Whack-a-mole

What about everyday sites?

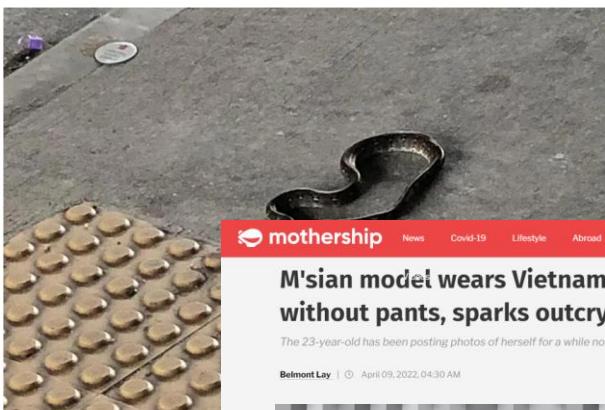


Everyday Sites

THE STRAITS TIMES

SINGAPORE

 LOG IN SUBSCRIBE

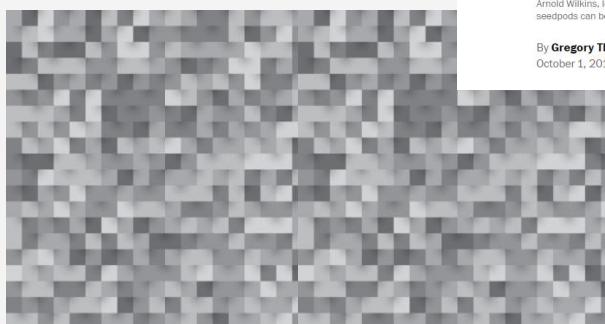


A python was spotted at a traffic junction near W STOMP

M'sian model wears Vietnamese nation without pants, sparks outcry in Vietnam

The 23-year-old has been posting photos of herself for a while now

Belmont Lay | April 09, 2022, 04:30 AM

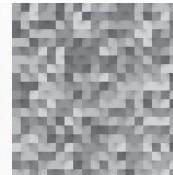


[Sections](#) [Sign In](#)

Health Health Care Medical Mysteries Science Well+Being

Health & Science

Phobia about holes is not officially recognized, but U.K. scientists look into it



What can we do?

How can we prevent users from getting bombarded by undesirable Images and Videos?





ViShield

Machine Learning
Incorporated





Our Capabilities



Real-time Image Filter

(Image Classification)

Hide images and gif that you choose not to see.

- Dogs
- Cats
- Snakes
- Trypophobia

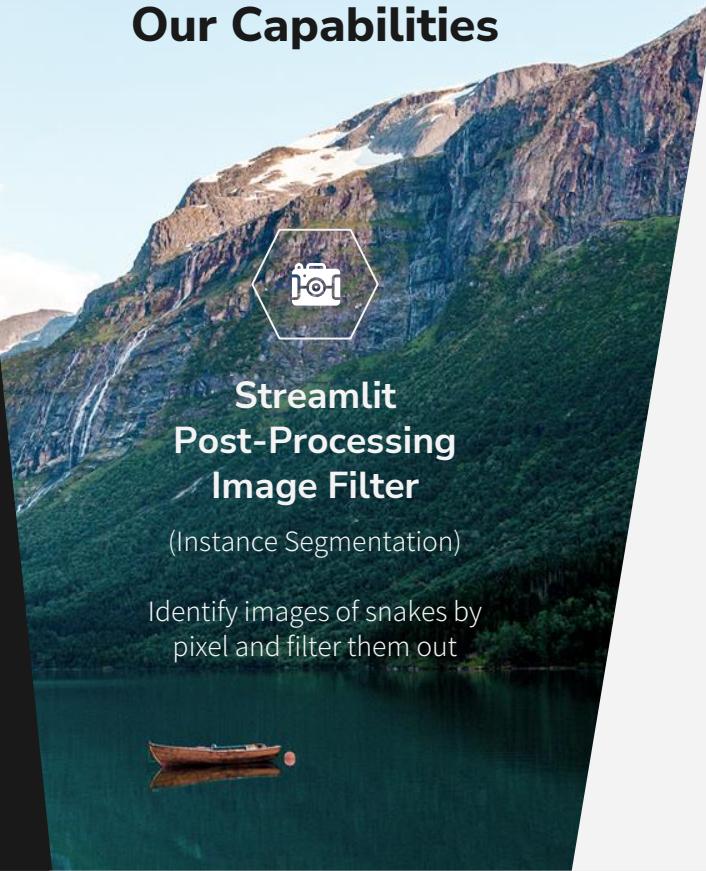
Chrome Extension



Streamlit Post-Processing Image Filter

(Instance Segmentation)

Identify images of snakes by pixel and filter them out



Streamlit Web App

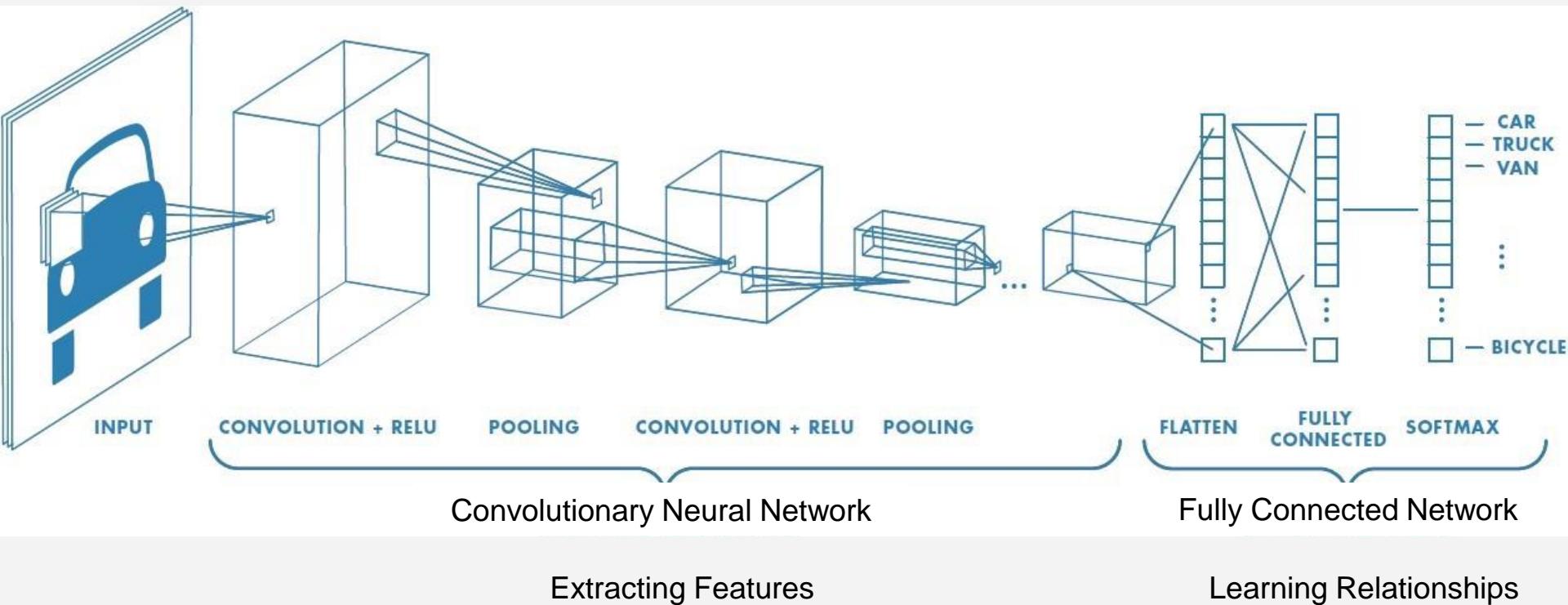


Streamlit Post-Processing Video Filter

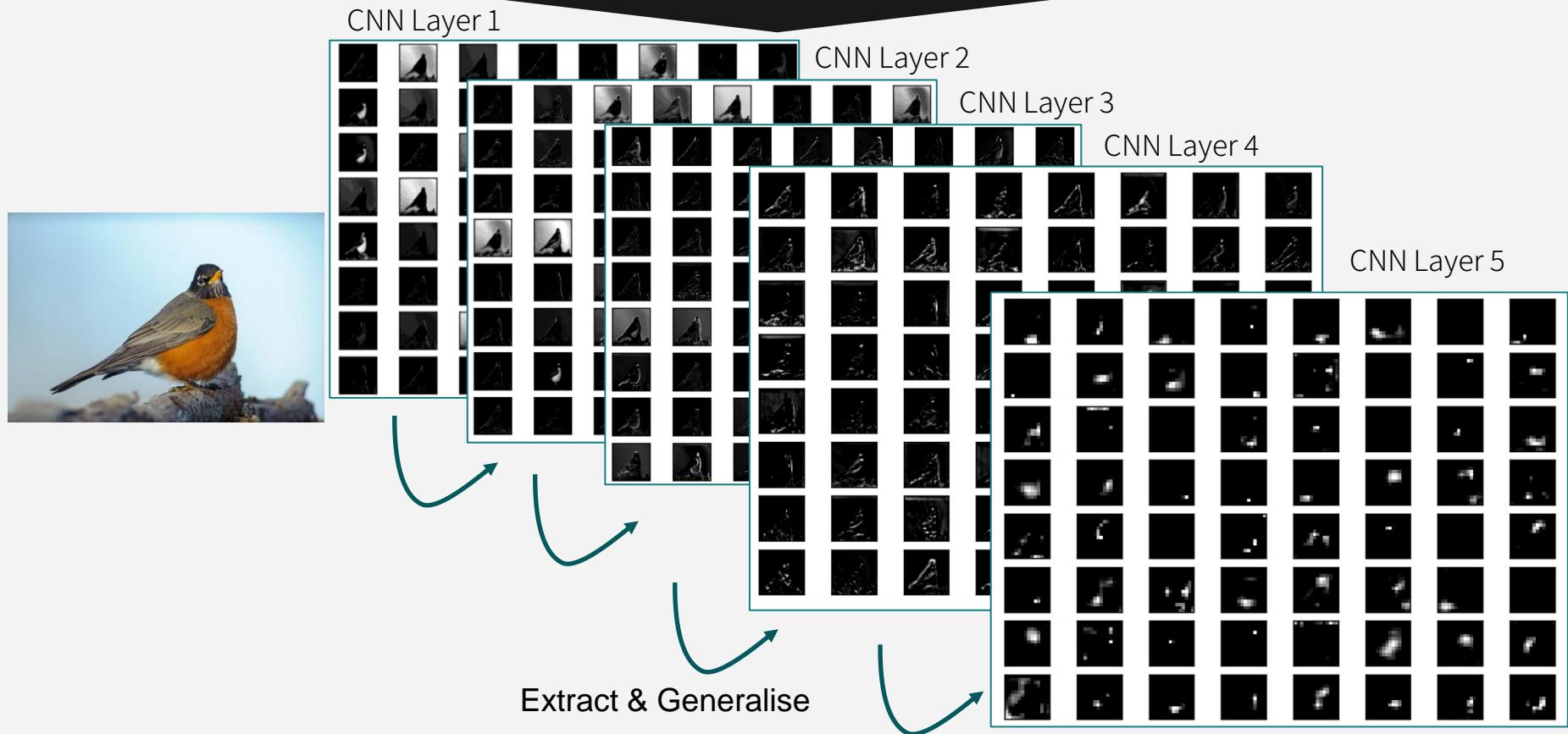
(Instance Segmentation)

Identify images of snakes in a video by pixel and filter them out

Computer Vision

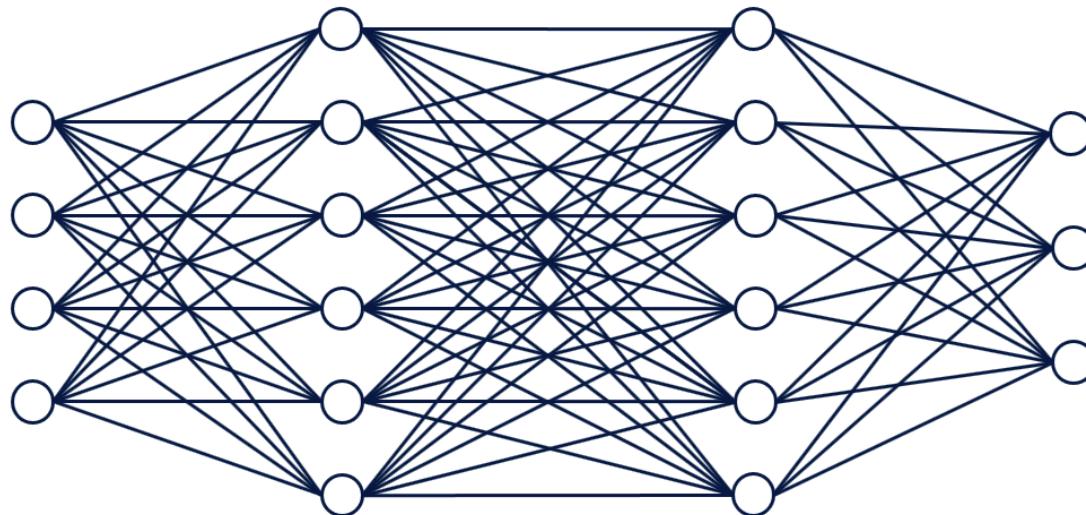


Convolutional Neural Network Feature Selection



Fully Connected Network

Relationship → Classification



Subtasks of Computer Vision

Classification



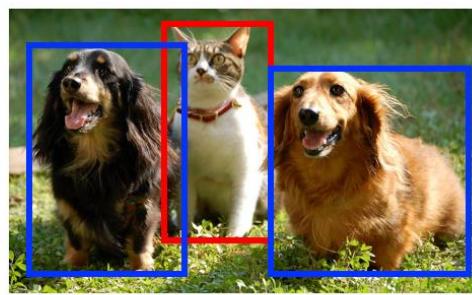
CAT

Classification
+ Localization



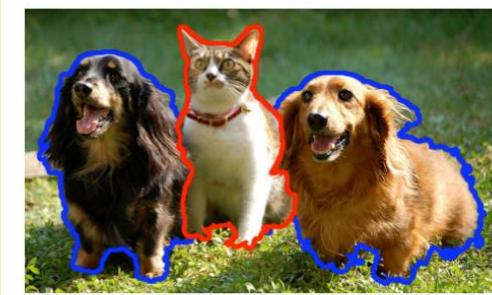
CAT

Object Detection



CAT, DOG

Instance Segmentation



CAT, DOG

Single object

Multiple objects





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Streamlit Post-Processing Image Filter

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Streamlit Post-Processing Video Filter

(Instance Segmentation)

Identify images of snakes in a video by pixel and filter them out

Streamlit Web App

Chrome Extension

Business Requirements & Success Factors

Business Requirements

- Javascript compatible model (serverless)
- Speed
- Model pretrained with relevant dataset



Success Factors

- Model accuracy above 70%
- Functioning chrome extension

Fulfilling Business Requirements

MobileNet V2

JavaScript Requirement



TensorFlow.js

Speed

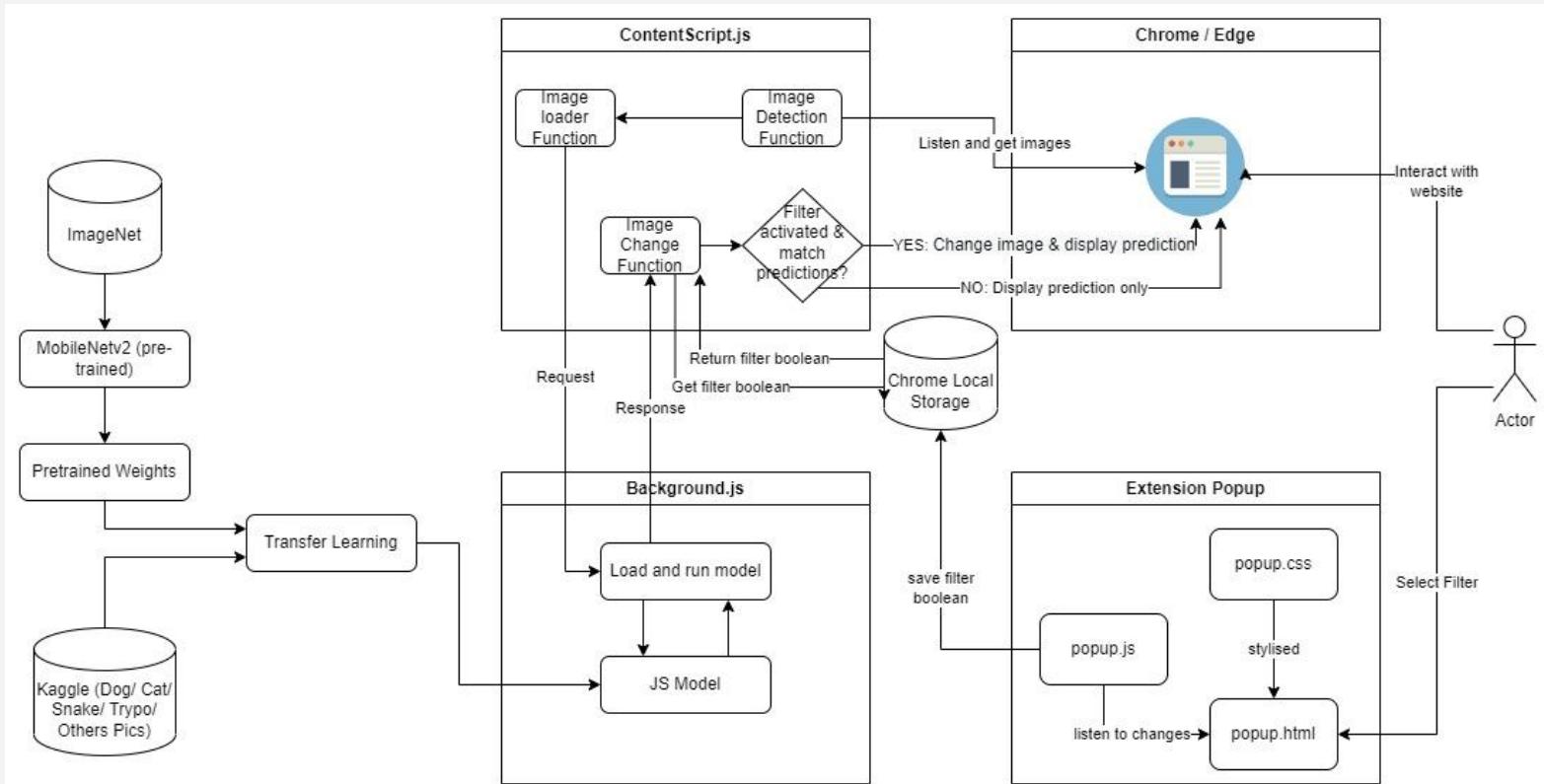
Relevant Pretrained Dataset



shutterstock.com • 1933018322

Model	Model Size (MB)	Inference time (sec)	Testing Accuracy
MobileNetV2	8.54	0.035	0.888
EfficientNet Lite-0	12.58	0.042	0.924
EfficientNet Lite-1	15.8	0.064	0.913
EfficientNet Lite-2	18.37	0.085	0.907
EfficientNet Lite-3	26.38	0.128	0.907
EfficientNet Lite-4	44.69	0.221	0.891

Model Architecture



Metrics

Hidden Layers	Regularisation	Validation Loss*	Validation Accuracy
1	None	0.1402	0.9586
1	EarlyStopping	0.1570	0.9603
2	EarlyStopping, Dropout	0.1533	0.9522

* Loss Function: categorical_crossentropy

Chrome Extension

Showcase





Our Capabilities



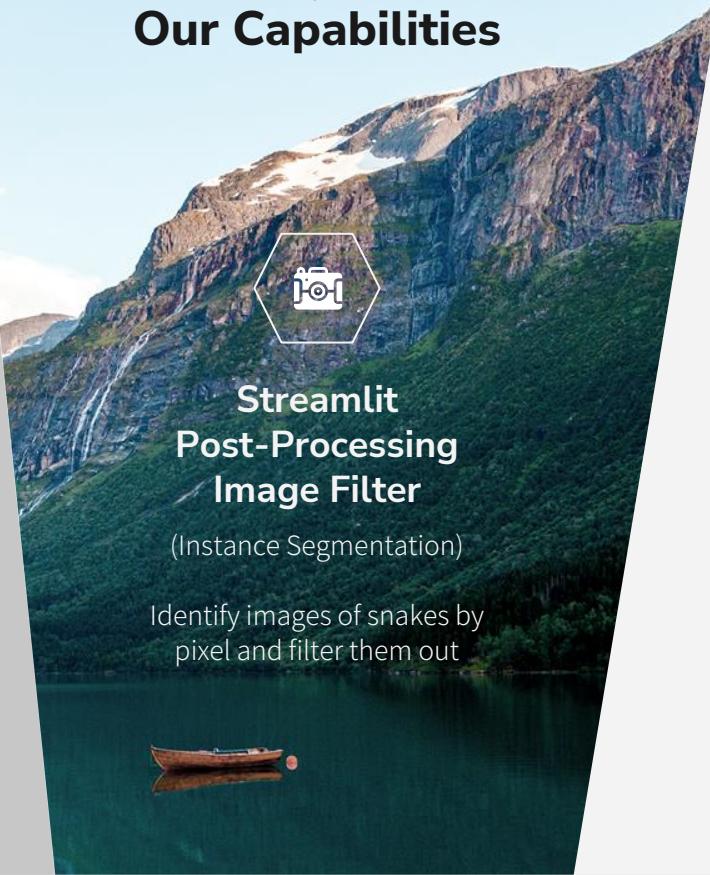
Chrome Extension

(Image Classification)

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Chrome Extension



Streamlit Post-Processing Video Filter

(Instance Segmentation)

Identify images of snakes in a video by pixel and filter them out

Streamlit Web App

Streamlit

Business Requirements & Success Factors

Business Requirements

- Balance between Speed and Accuracy
- Model should work on both images and videos



Success Factors

- Bounding mAP_0.5 > 0.5
- Mask mAP_0.5 > 0.5
- Functioning Streamlit

Fulfilling Business Requirements

YOLOv7

Works on Images & Videos



Speed & Accuracy

PWC Categories	Model	FPS	Mask AP
Real-time Instance Segmentation	SparselInst-608	40	37.9
Video Instance Segmentation	IDOL	17.6	64.3
Real-Time Object Detection	YOLOv7-E6E	36	64.0

Data Preparation

roboflow



Example of mask segmentation annotation.
Green border denotes polygon coordinates

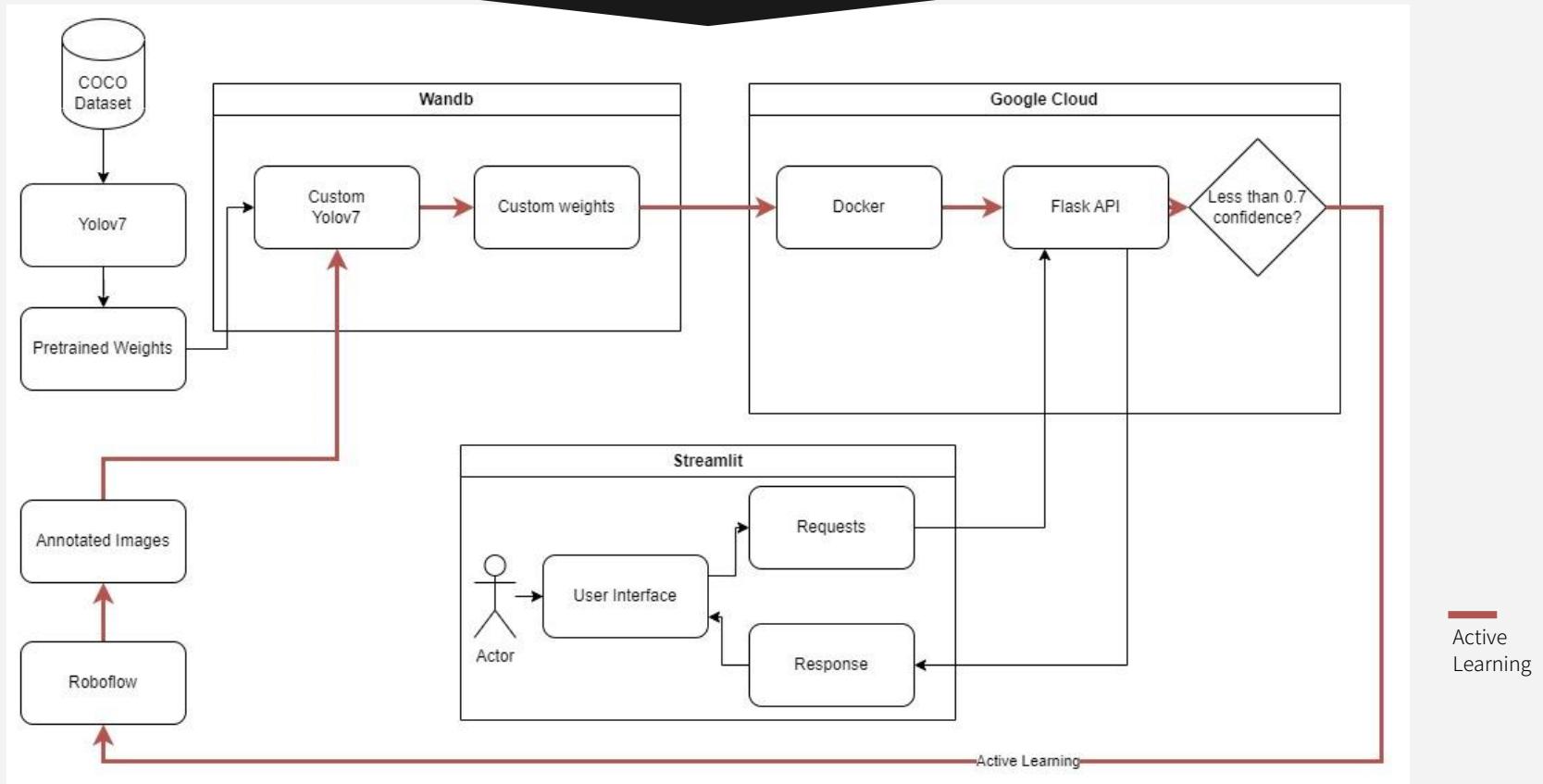
Output Label (YOLOv7 format)

```
0 0.459375 0.57777778125 0.44375 0.5611111109375 0.44  
0 0.3453125 0.3333333328125 0.3515625 0.3166666671875  
0 0.48887583125 0.601851853125 0.493214325 0.611111110  
0 0.425 0.46944444374999994 0.42206302500000004 0.4907
```

Class

Polygon Coordinates

Model Architecture

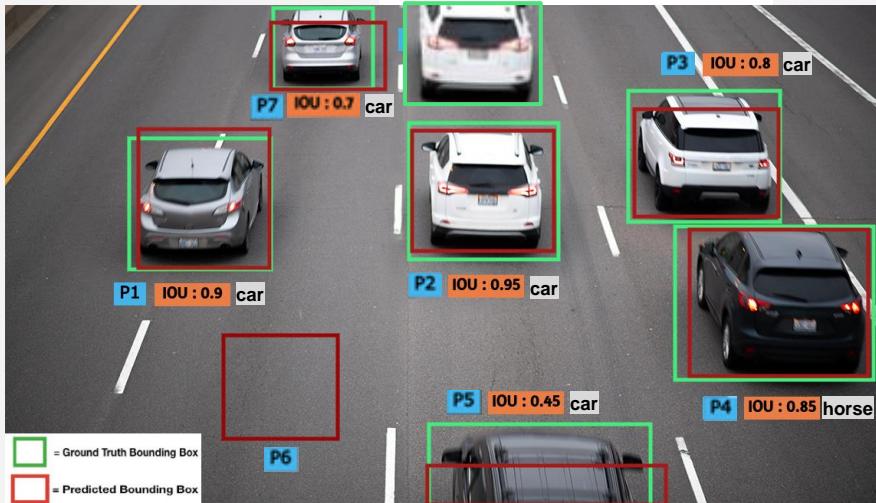


Metric Explanation

AP

Intersection over Union

$$\text{IoU} = \frac{\text{Area of Overlap}}{\text{Area of Union}}$$



$$p_{\text{interp}}(r) = \max_{\tilde{r}: \tilde{r} \geq r} p(\tilde{r})$$

Interpolated Precision for a given Recall Value (r)

No	TP/FP/FN @ IoU 0.5	Precision TP/(TP+FP))	Recall TP/(TP+FN))	Precision_interp
P1	TP	1/1 = 1	1/3 = 0.33	1
P2	TP	2/2 = 1	2/4 = 0.5	1
P3	TP	3/3 = 1	3/5 = 0.6	1
P4	FN	3/3 = 1	3/5 = 0.6	1
P5	FP	3/4 = 0.75	3/5 = 0.6	1
P6	FP	3/5 = 0.6	3/5 = 0.6	1
P7	FP	4/6 = 0.67	4/6 = 0.67	0.67

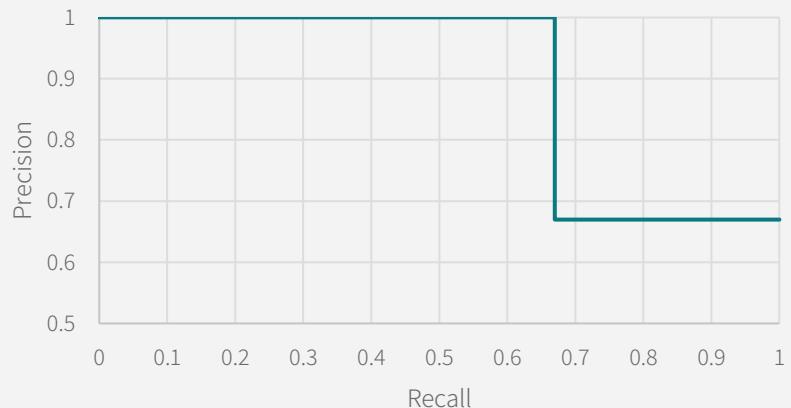
Metric Explanation AP

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P4	FN	3/3 = 1	3/5 = 0.6	1
P5	FP	3/4 = 0.75	3/5 = 0.6	1
P6	FP	3/5 = 0.6	3/5 = 0.6	1
P7	FP	4/6 = 0.67	4/6 = 0.67	0.67

$$p_{\text{interp}}(r) = \max_{\tilde{r}: \tilde{r} \geq r} p(\tilde{r})$$

Interpolated Precision for a given Recall Value (r)

11 Points Interpolated Precision-Recall Curve



$$AP = \frac{1}{11} \sum_{r \in \{0, 0.1, 0.., 0.9, 1\}} p_{\text{interp_p}}(r)$$

$$= \frac{1}{11} (1 + 1 + 1 + 1 + 1 + 1 + 1 + 0.67 + 0.67 + 0.67 + 0.67)$$

AP ≈ 0.879

mAP: Average AP for all classes

Active Learning Metrics



Round	No of Training Images*	No of Validation Images	Weights	mAP_0.5 (B)	mAP_0.5 (M)	Precision	No of Testing Images	No of Testing Images send for annotate below 70% confidence *
1	543	55	Yolov7 weight	0.4436	0.4127	0.7289	1000	100
2	843	55	Yolov7 weight	0.4389	0.4504	0.7891	1000	100
3	1196	55	weight from R2	0.4535	0.4602	0.7558	1000	100
4	1413	75	weight from R3	0.5372	0.5396	0.8639	1000	100

*Only the first 100 images are annotated

Streamlit

SHOWCASE



<https://bit.ly/3g96L3J>



Video Segmentation Example



Source: [Deadliest Job in America - Snake Milker! - YouTube](#)

CONCLUSION



Success Factors Evaluation

Tasks	Factors	Outcomes
Image Classification	Validation Image Accuracy > 70%	0.9586
Image Classification	Functioning Chrome Extension	Yes
Instance Segmentation	mAP_0.5(B)	0.5372
Instance Segmentation	mAP_0.5(M)	0.5396
Instance Segmentation	Functioning Streamlit App	Yes

3 Prong Approach

Government
Regulations
through laws
and ISP blacklist

Opensource
URL blacklist
([GitHub](#))



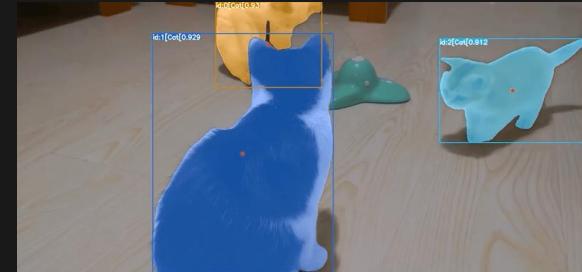
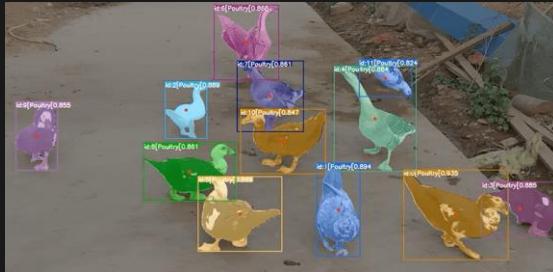
ViShield

Recommendations

Always rely on multiple redundancies to perform our task reliably and effectively

Future Steps

- Allow real time streaming of output logs from model to Streamlit
- Continue to improve on Instance Segmentation mAP results
- Explore deeper on video instance segmentation such as IDOL
- Expand feature to allow segmentation on YouTube or Live Stream
- Expand filter classes beyond dogs, cats, snakes, tropophobia images, such as car type, car plate which can be used for autonomous driving





THANKS

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