

Parking Vacancies Detection

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Athens University of Economics & Business

About the team



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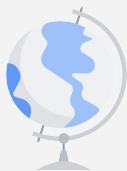


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Business Administration -Athens University of Economics and Business

About the Idea



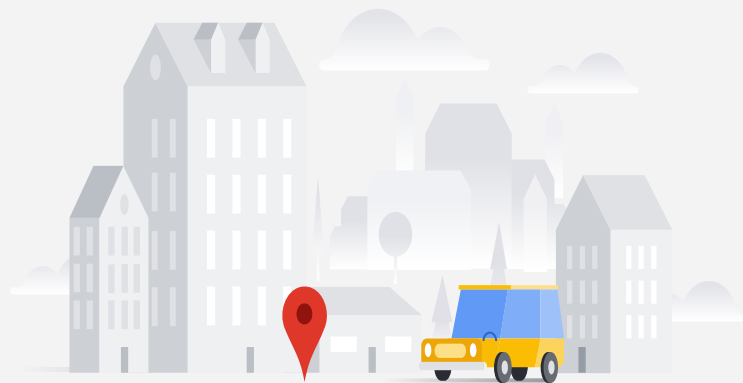
Estimations of 1,2 Billion Vehicles Worldwide



Not enough parking space in crowded cities



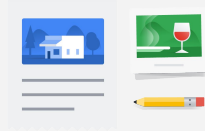
Not enough time to find a parking space



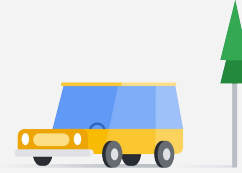
About the Idea



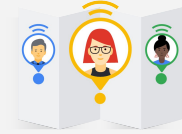
Parking Detection



Data icons
(parking places)

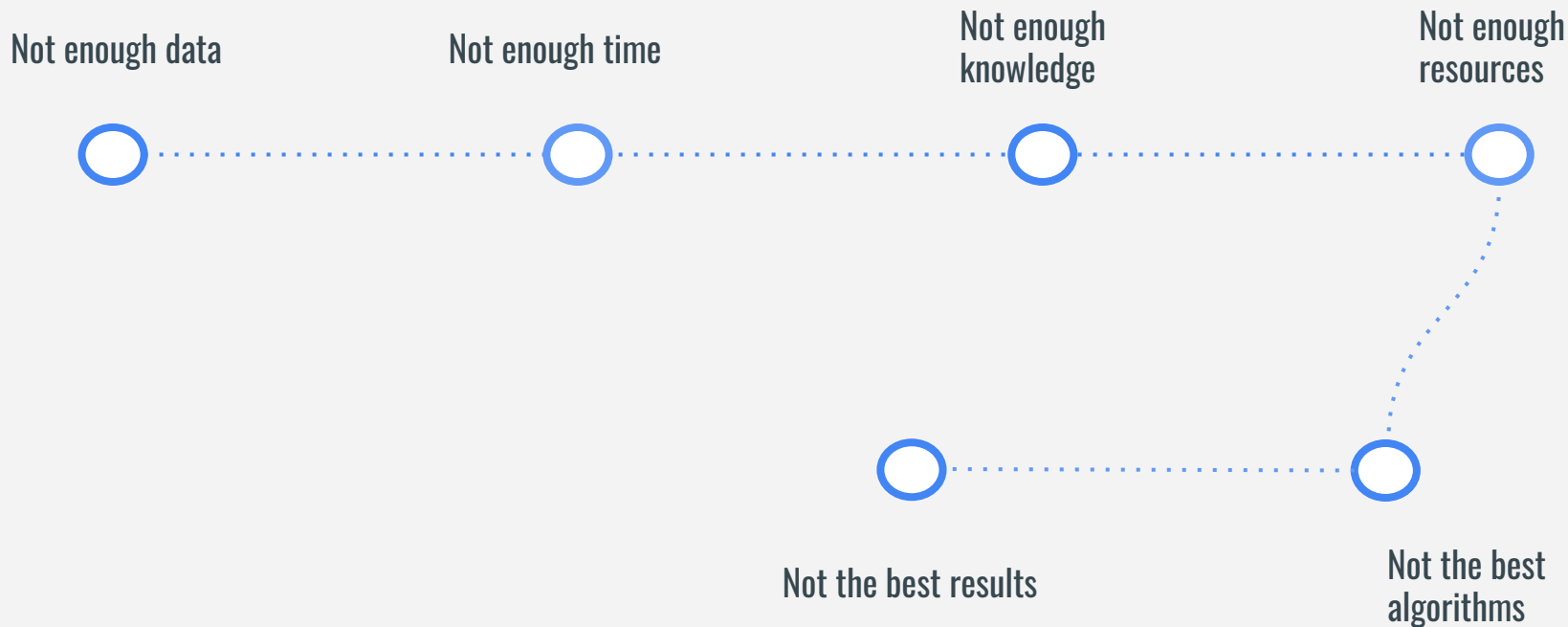


Car and Parking
detection



Happy People

When we faced the reality - Problems



The dataset

Our dataset contains 150x150 images of



<CAMERA> can be A or B



<CLASS> can be free or busy



YYYYMMDD_HHMM is the zero-padded 24-hour capture datetime



<SLOT_ID> is a local ID given to the slot for that particular camera



The dataset

Extra files - FULL_IMAGE 1000x750



<WEATHER> can be SUNNY, OVERCAST or RAINY



<CAPTURE_DATE> is the zero-padded YYYY-MM-DD formatted capture date



<CAM_ID> is the number of the camera, ranging 1-9



<CAPTURE_TIME> is the zero-padded 24-hour HHMM formatted capture time

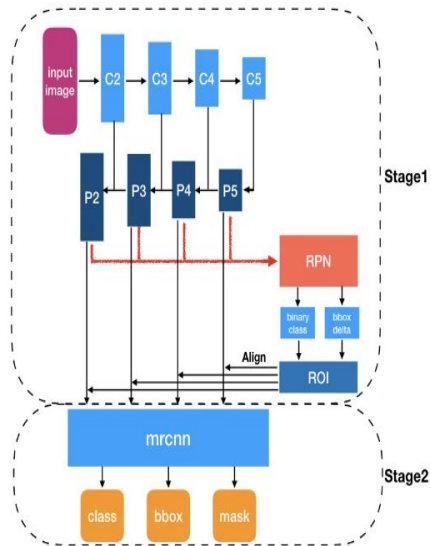


Methodology - Models Used

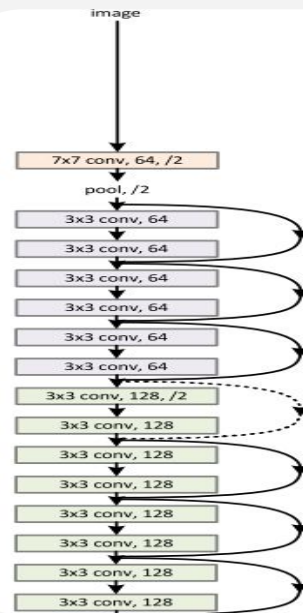
CNN

conv2d_1 (Conv2D)	(None, 150, 150, 32)	2432
max_pooling2d_1 (MaxPooling2D)	(None, 75, 75, 32)	0
conv2d_2 (Conv2D)	(None, 75, 75, 64)	18496
max_pooling2d_2 (MaxPooling2D)	(None, 37, 37, 64)	0
conv2d_3 (Conv2D)	(None, 37, 37, 96)	55392
max_pooling2d_3 (MaxPooling2D)	(None, 18, 18, 96)	0
conv2d_4 (Conv2D)	(None, 18, 18, 96)	83040
max_pooling2d_4 (MaxPooling2D)	(None, 9, 9, 96)	0
flatten_1 (Flatten)	(None, 7776)	0
dense_1 (Dense)	(None, 512)	3981824
activation_1 (Activation)	(None, 512)	0
dense_2 (Dense)	(None, 2)	1026

R-CNN



ResNet 50



Methodology - CNN model

ReLu

Activation

Softmax

Last dense layer - Activation

Adam Optimizer

Lr = 0.001 categorical cross - entropy as loss - accuracy metric

Methodology - R.CNN model

First Stage

Neural Net. RPN scans all FPN top-bottom pathways and propose regions which may contain objects

Anchors is a method bund features to its raw image location

Ground-truth classes and bounding boxes are assigned to individual anchors according to IoU value

RPN figure out where of the feature map get an object and what size the bounding box is.

Second Stage

Neural Network takes proposed regions by stage 1 and assign to several specific areas of a feature map

It scans these areas and generates object classes, bounding boxes and masks

Without anchors, it uses ROI Align to locate the relevant areas of feature map

Methodology - ResNet 50

Instead of trying to learn some features it learn from residuals

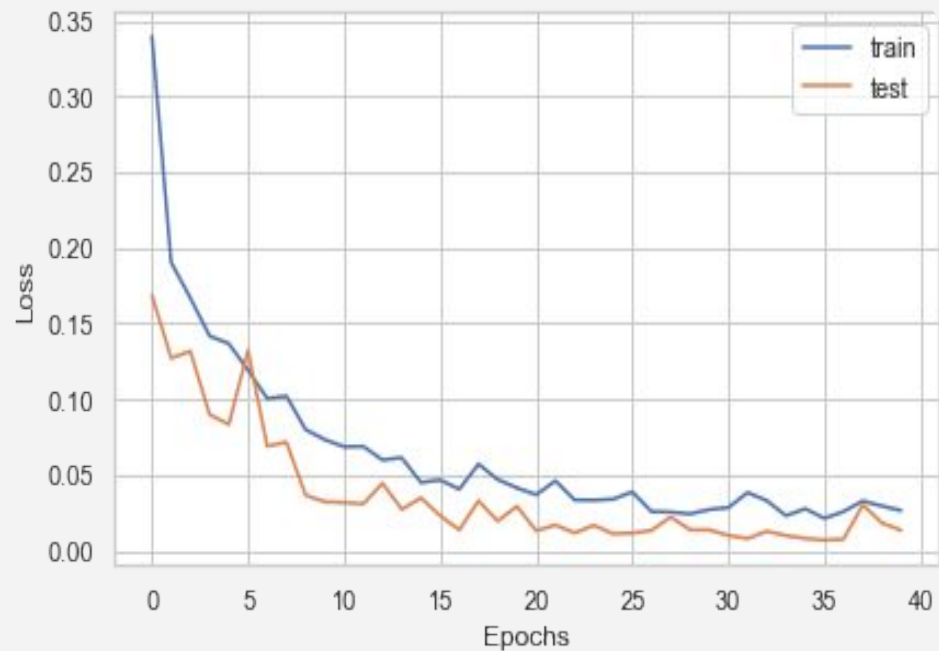
Residuals are a subtraction of features learned from input of the layer.

ResNet 50 uses shortcut connection - Directly connects n th layer to $(n+x)$ th layer

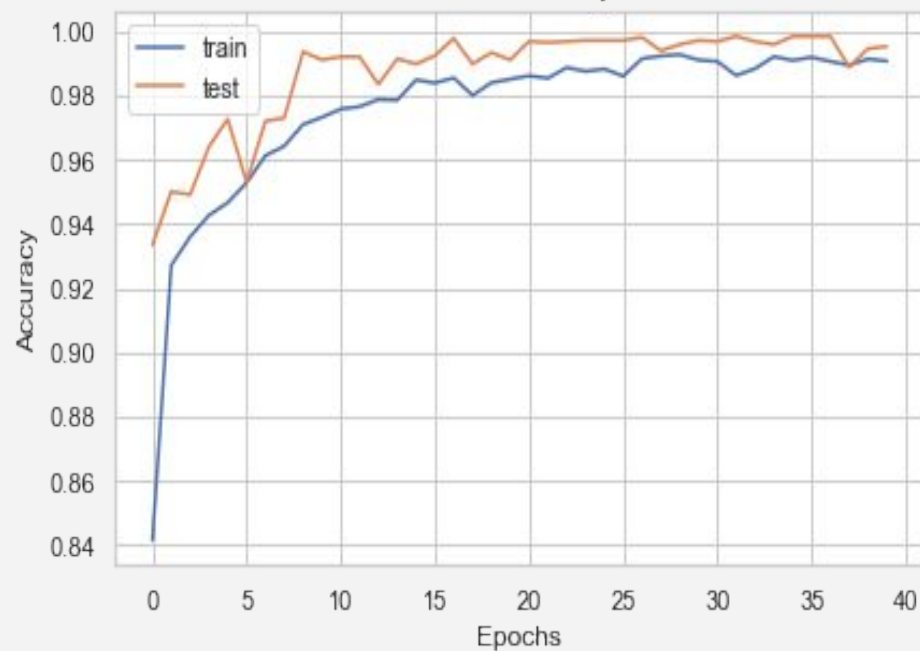
Easier from training deep convolutional neural networks and degrading is resolved.

Results

Model Loss



Model Accuracy



Results



Thank You

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