A survey on deep learning techniques in image and video semantic segmentation

(paper analysis)

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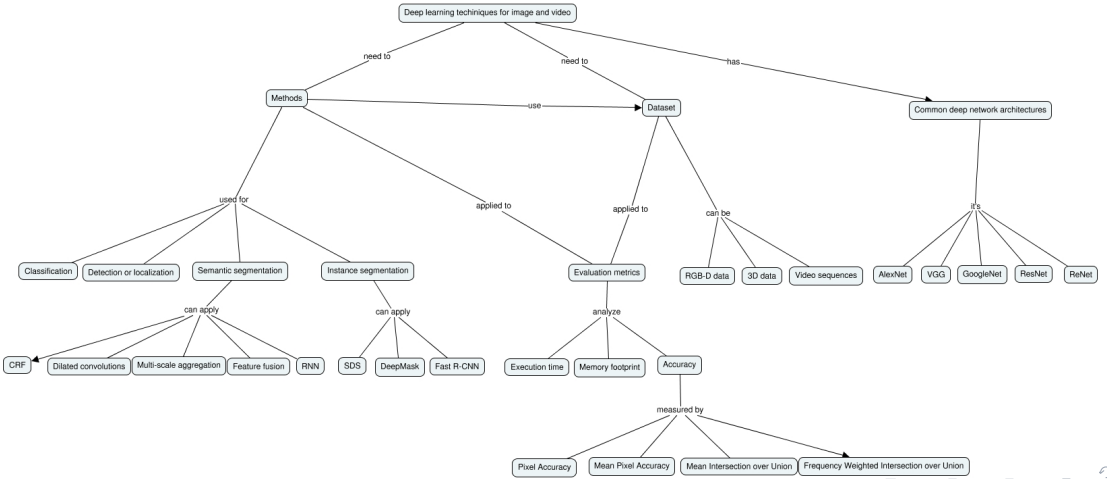
Concept Map


Deep learning techiniques for image and video
need to
need to
has
Methods
use
Dataset
Common deep network architectures
used for
applied to
applied to
can be
it's
Classification
Detection or localization
Semantic segmentation
Instance segmentation
Evaluation metrics
RGB-D data
3D data
Video sequences
AlexNet
VGG
GoogleNet
ResNet
ReNet
can apply
can apply
analyze
CRF
Dilated convolutions
Multi-scale aggregation
Feature fusion
RNN
SDS
DeepMask
Fast R-CNN
Execution time
Memory footprint
Accuracy
measured by
Pixel Accuracy
Mean Pixel Accuracy
Mean Intersection over Union
Frequency Weighted Intersection over Union

CNN- How it works?

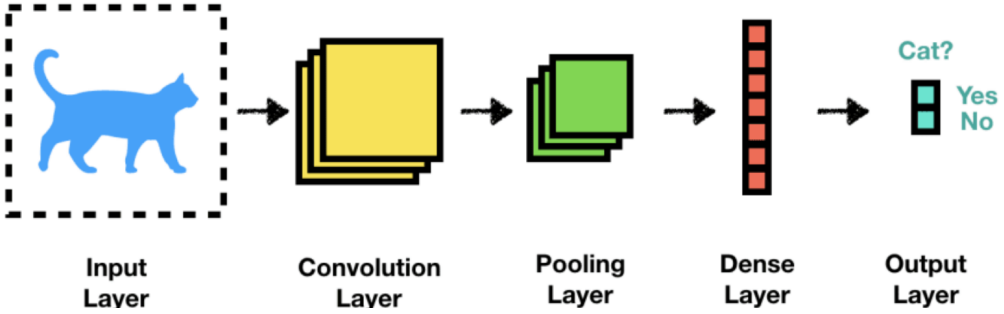


Figure: Convolutional Neural Network [Sha19]

Common deep networks architecture

COMPARATIVE FOR COMMON DEEP NETWORK ARCHITECTURES			
Network	**Year champion ILSVRC***	**Number of Layers**	**Accuracy**
AlexNet	2012	3	84.6%
VGG	2013	16	92.7%
GoogleNet	2014	22	93.3%
ResNet	2016	152	96.4%

Table: Deep network architectures. [GGOEO$^+$18]

*ILSVRC (ImageNet Large Scale Visual Recognition Challenge)

Methods to image analysis

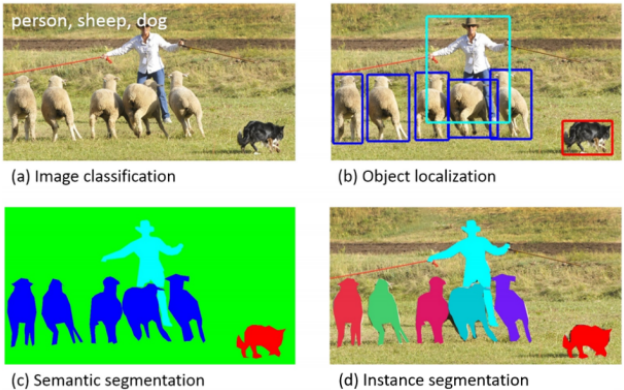


Figure: Methods to image analysis. [LMB+14]

Evaluation Metrics

Execution time

Memory footprint

Accuracy

Accuracy

Figure: Accuracy evaluation. [Ros16]

Accuracy results

COMPARATIVE ACCURACY RESULTS (METHODS AND DATASETS) (%)									
Method / Dataset	**PASCAL VOC-2012**	**Pascal- Person-Part**	**CamVid**	**CityScapes**	**Stanford Background**	**SiftFlow**	**SUN3D**	**ShapeNet Part**	**Youtube-Objects**
PSPNet	85,4								
DeepLab		64,94							
DAG-RNN			91,60						
rCNN					80,20				
LSTM-CF							58,50		
PointNet								83,70	
PointNet++								85,10	
DGCNN								85,10	
Clockwork Convent									68,50
SegmPred				59,40					

Table: Accuracy results for the most relevant methods and dataset. [GGOEO$^+$18]

Limitations

Advantages and disadvantages

Wich cases doesn't apply deep learning?

Dataset size it isn't enought.

Not sure about the object.

Deep learning vs. Classic methods

References I

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- Tsung-Yi Lin, Michael Maire, Serge Belongie, James Hays, Pietro Perona, Deva Ramanan, Piotr Dollár, and C Lawrence Zitnick, *Microsoft coco: Common objects in context*, European conference on computer vision, Springer, 2014, pp. 740–755.
- Adrian Rosebrock, *Intersection over union (iou) for object detection*, 2016.
- Shashikant, *Convolutional neural network: A step by step guide*, 2019.