

# Cloud & Open Source Solutions for Computer Vision

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# Features Comparison

<b>Features</b>	<b>Amazon</b>	<b>Google</b>	<b>Microsoft</b>	<b>IBM</b>
<b>Object Detection</b>	✓	✓	✓	✓
<b>Facial Analysis</b>	✓	✓	✓	✓
<b>Facial Recognition</b>	✓	✗	✓	✗
<b>Web Detection</b>	✗	✓	✗	✗
<b>Optical Character Recognition (OCR)</b>	✓	✓	✓	✗

# Object Detection

can detect and extract multiple objects in an image.

Amazon



Google



Microsoft



# Facial Analysis

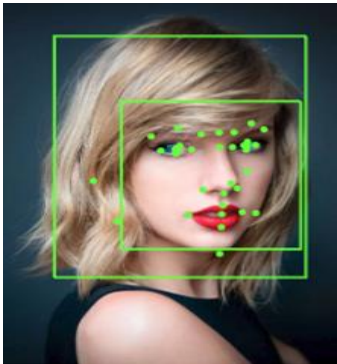
detect human faces and face attributes (age, emotion, gender...)

## Amazon



looks like a face	99.9 %
appears to be female	99.9 %
age range	23 - 38 years old
not smiling	78.4 %
not wearing glasses	99.7 %
not wearing sunglasses	99.9 %
eyes are open	99.9 %
mouth is closed	94.8 %
does not have a mustache	99.6 %
does not have a beard	99.7 %

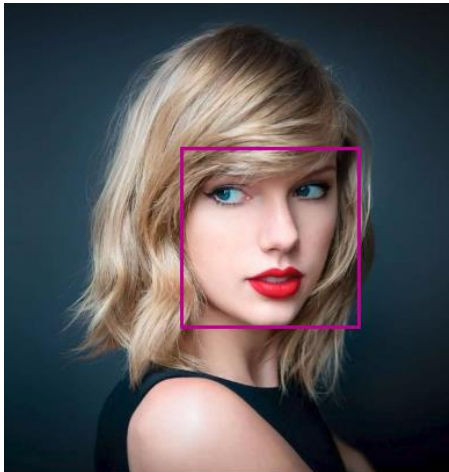
## Google



Joy	■	Very Unlikely
Sorrow	■	Very Unlikely
Anger	■	Very Unlikely
Surprise	■	Very Unlikely
Exposed	■	Very Unlikely
Blurred	■	Very Unlikely
Headwear	■	Very Unlikely

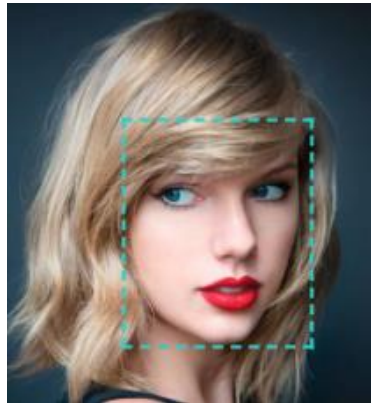
Confidence 99%

## Microsoft



GENDER	female
AGE	22
GLASSES	NoGlasses
EMOTION	Neutral

## IBM




Face 1	
age 19-21	1.00
FEMALE	1.00

# Facial Recognition


Compare faces to see how closely they match based similarity percentage

## Amazon

Reference face




Comparison faces



Done with the demo?  
[Learn more](#)

▼ Results



► Request

► Response

## Microsoft




Image URL

Image URL

Verification result: The two faces belong to the same person. **Confidence is 0.55786.**

# Web Detection

detects web references to an image

Input Image




Result

Pages with Matched Images

[www.businessinsider.com/...](http://www.businessinsider.com/...)  
<https://www.businessinsider.com/best-selling-luxury-watches-jomashop-2017>  
[uk.businessinsider.com/...](http://uk.businessinsider.com/...)  
<http://uk.businessinsider.com/best-selling-luxury-watches-jomashop-2017>  
[uk.businessinsider.com/...](http://uk.businessinsider.com/author/amir-ismael/mostread/desc)  
<http://uk.businessinsider.com/author/amir-ismael/mostread/desc>  
[zvipstore.com/...](http://zvipstore.com/...)  
<http://zvipstore.com/best-mens-luxury-watches/best-mens-luxury-watches-17-splendid-design-2017-2018-models-doomwatches-com/>  
[zvipstore.com/...](http://zvipstore.com/...)  
<http://zvipstore.com/best-mens-luxury-watches/best-mens-luxury-watches-7-splendid-design-inspiration-20-men-s-2017-top-for/>

Google

The 5 best luxury watches you can buy right now, according to an expert

 Amir Ismael, Insider Picks Nov 3, 2017, 10:41 AM

*The Insider Picks team writes about stuff we think you'll like. Business Insider has affiliate partnerships, so we get a share of the revenue from your purchase.*

Every man should own a wrist watch that is both stylish and functional.

Whether it be priced under \$500, \$250, or even \$100, a nice watch can drastically improve your style, while doing its job of telling the time.




Image via @jomashop on Instagram

# Optical Character Recognition (OCR)

## Typewritten Text



## Google



+Page 1

+Block 1

STAY TUNED COMING SOON

+Block 2

UNDER CONSTRUCTION

## Amazon



▼ Results

US English only

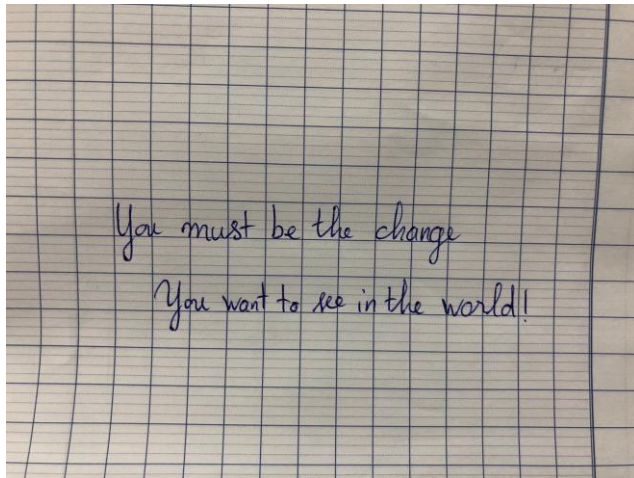
STAY	TUNED
COMING	soon
UNDER	CONSTRUCTION

## Microsoft

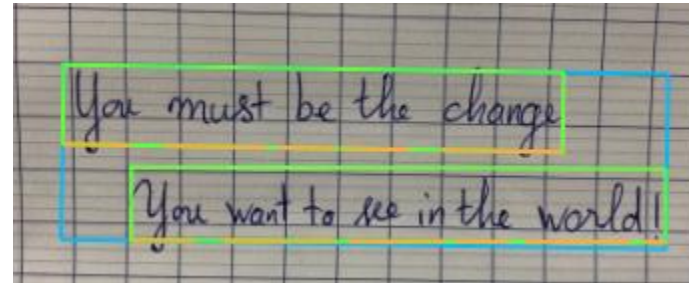
STAY TUNED  
COMING SOON  
UNDER CONSTRUCTION

# Optical Character Recognition (OCR)

## Handwritten Text



## Google



+Page 1

+Block 1

You must be the change

You want to see in the world !

## Microsoft

you must be the chang






you want to see in the world

megaremains

# Optical Character Recognition (OCR)

	Google	Amazon	Microsoft
<b>Boxing style</b>	<b>Group</b>	<b>Word</b>	<b>Sentence</b>
<b>Language Recognition</b>	<b>Y</b>	<b>N</b>	<b>Y</b>
<b>Typewritten Text</b>	<b>~81%</b>	<b>~97%</b>	<b>~97%</b>
<b>Handwritten Text</b>	<b>~91%</b>	<b>-</b>	<b>~83%</b>

# Open Source Summary

Features	Available
Facial Recognition	
Facial Detection	
Object Detection	
Optical Character Recognize (OCR)	
Web Detection	

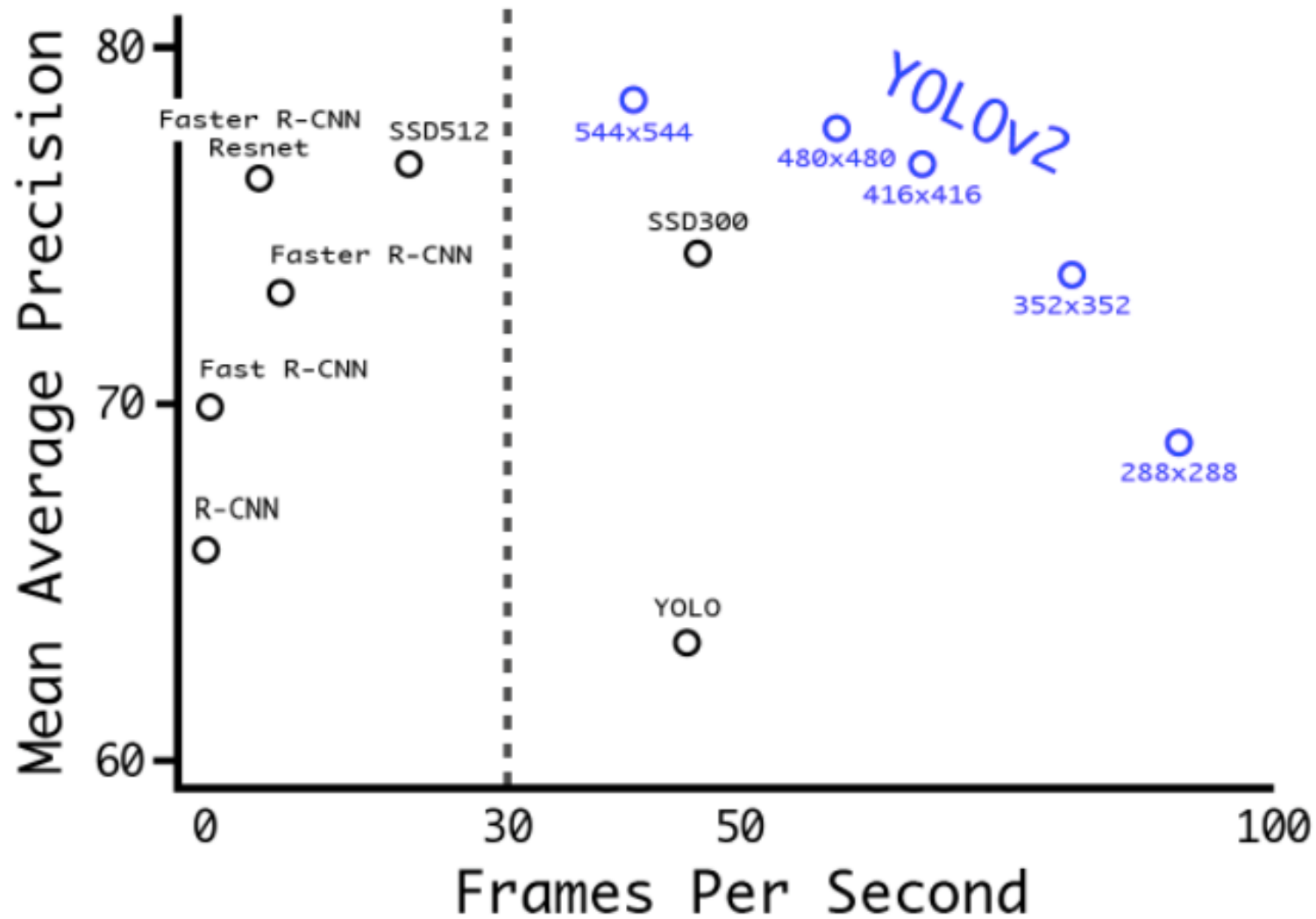
# Facial Recognition

Open Source	face_recognition	OpenFace	SphereFace
<b>Train Dataset</b>	-	<ul style="list-style-type: none"> <li>- FaceSrub (106,863 image)</li> <li>- CASIA-WebFace (494,414 image)</li> </ul>	CASIA-WebFace (494,414 image)
<b>Test Dataset</b>	Labeled Faces in the Wild (13,000 image)	Labeled Faces in the Wild (13,000 image)	Labeled Faces in the Wild (13,000 image)
<b>Accuracy</b>	99.38%	92.92%	99.30%
<b>Test on TIC Dataset (39 person, ~ 500 images)</b>	- Accuracy: 91,56%	- Accuracy: 92,24%	- Accuracy: 98,86%

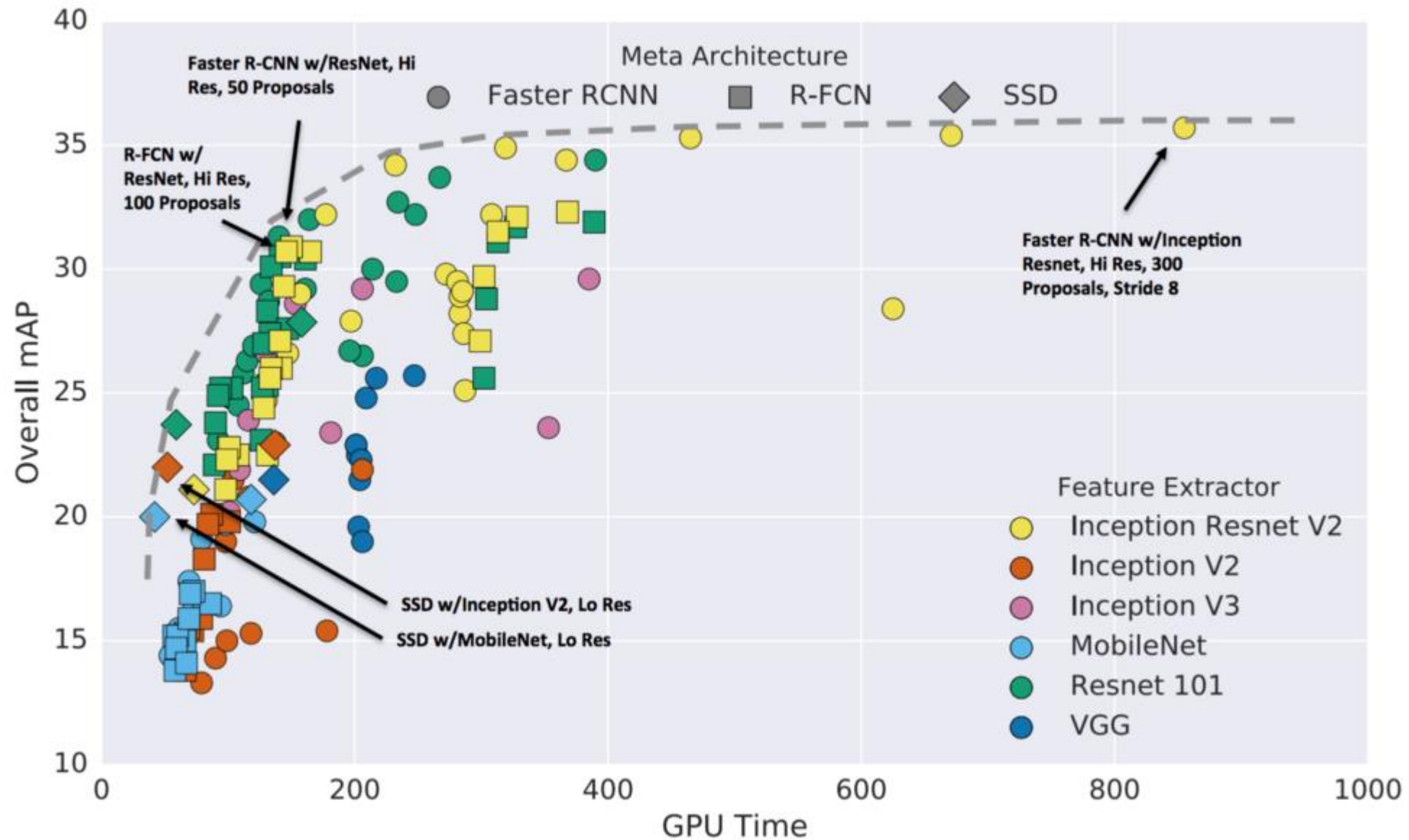
# Facial Detection

Open Source	ocv-DNN	ocv-HAAR	dlib-HOG	dlib-CNN	face_recognition-HOG	face_recognition-CNN	MTCNN
Test on GTX1080	18ms	42ms	109ms	42ms	108ms	40ms	334ms

# Object Detection



# Object Detection





# Optical Character Recognize (OCR)

Open Source	tesseract
Train Dataset	About 500,000 lines per language
Test Dataset	1000 lines per language
Accuracy	different language have different accuracy

## Accuracy

Lang	Truth Words	Char Error Rates			Word Error Rates		
		Base	T-LSTM	LSTM+Dict	Base	T-LSTM	LSTM+Dict
Czech	19319	3.08	1.86	1.81	12.69	8.26	7.58
English	21543	2.51	1.95	1.76	7.58	7.18	5.77
French	20746	5.98	3.1	2.98	16.63	11.82	10.47
Hungarian	17977	3.75	2.95	2.86	14.61	12.26	11.45
Indonesian	16616	2.77	1.96	2.26	9.45	8.64	7.51
Dutch	18878	6.23	6.65	5.97	16.38	17.55	15.75
Norwegian	18129	2.19	1.74	1.81	7.73	5.87	5.7
Portuguese	17726	2.91	1.9	1.87	10.09	7.46	6.75
Spanish	20333	4.28	2.5	2.31	11.63	8.55	7.45
Vietnamese	22472	4.04	3.55	2.61	10.89	10.05	7.93

# Open Source - Evaluation

Features	Available	Evaluation
Face Recognition		- <b>face_recognition</b> - <b>SphereFace</b>
Face Detection		- <b>ocv-DNN</b>
Object Detection		
Optical Character Recognize (OCR)		- <b>Tesseract</b>
Web Detection	