

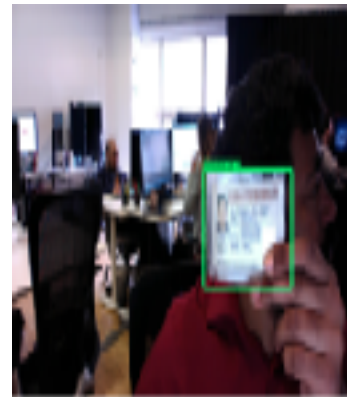
ID Card Detection (iKnowU)

Dec 5, 2019
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Initial Checks

- Detect Card from the image
- Check if the card is an ID card
- Check if Lighting is good
- Check if the image is blurred
- Pass the image to the OCR
- Information Extraction
- Next Steps
- Additional Work
- Flow Chart

Detect Card from the image



Algorithm - Object Detection

- RCNN model Trained on different kinds of cards with bounding boxes.
- We predict the class of the object in the image, as well as a rectangle(called bounding box) containing that object.

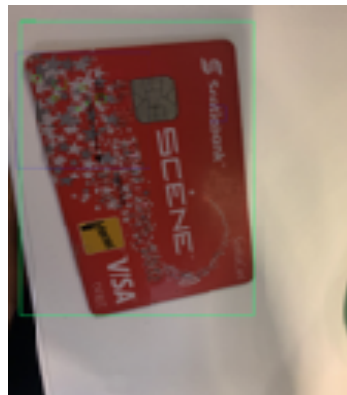
Reference:

<https://towardsdatascience.com/faster-r-cnn-object-detection-implemented-by-keras-for-custom-data-from-googles-open-images-125f62b9141a>

Check if the card is an ID card



One Face, One
pair of Eyes
Detected



One Face, Six
pair of Eyes
Detected



One Face, One
pair of Eyes
Detected



Zero face, Zero
pair of eyes
detected

Algorithm - Haar Cascades

- Haar-like features are digital image features used in object recognition.
- A Haar feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums.

Reference:

<http://www.willberger.org/cascade-haar-explained/>

Check if Lighting is good



Not Enough
Light!



Not Enough
Light!



Good
Lighting!



Good
Lighting!

Technique - Average Pixel Intensity

- Converts the RGB image to GreyScale
- Looks at the average pixel intensity throughout the image
- Detects lighting based on the threshold

Check if image is blurred



Blurred!



Clear Image!



Blurred!



Not Blurred

Technique - Laplacian Edge Detection

- Converts the RGB image to GreyScale
- Get the Laplacian of the image
- The Laplacian highlights regions of an image containing rapid intensity changes
- Find the variance of the laplacian
- With very low variance, there is a tiny spread of responses, indicating there are very little edges in the image. The more an image is blurred, the less edges there are.

Pass the Image to the OCR



Text Captured

"on canada driver's licence permis de
conduire ontario 12 names nom roy vishal
rajeshwar 12 exhibition cres brampton,
on, l7a 4b8 mmero r6906 77278 90908
2017/01/30 4d number 2021/09/08 4b
exp/ exp. 4a ss del dr8271093 16 hgt/haut
172 cm 5 ddiref m 15 sex sexe g 9 class
catég 12 restl x cond 3 dobobn
1989/09/08 64 "

Information Extraction

"on canada driver's licence permis de conduire
ontario 12 names nom **roy vishal rajeshwar** 12
exhibition cres brampton, on, **17a 4b8** mmero
r6906 77278 90908 2017/01/30 4d number
2021/09/08 4b exp/ exp. 4a ss del dr8271093 16
hgt/haut 172 cm 5 ddiref m 15 sex sexe g 9 class
catég 12 restl x cond 3 dobobn **1989/09/08 64** "



First Name



Middle Name



Last Name



Postal Code



Date of Birth



Expiry Date

Next Steps

- Create Matching score

Additional Work - Object Segmentation



Advantages

- Captures the Exact Pixel locations of the card from the image
- Captures the card even if it is cluttered

Issues

- Doesn't perform good on Canadian Licences.
- Requires image data set of Canadian Licenses to train a Object Segmentaion Model

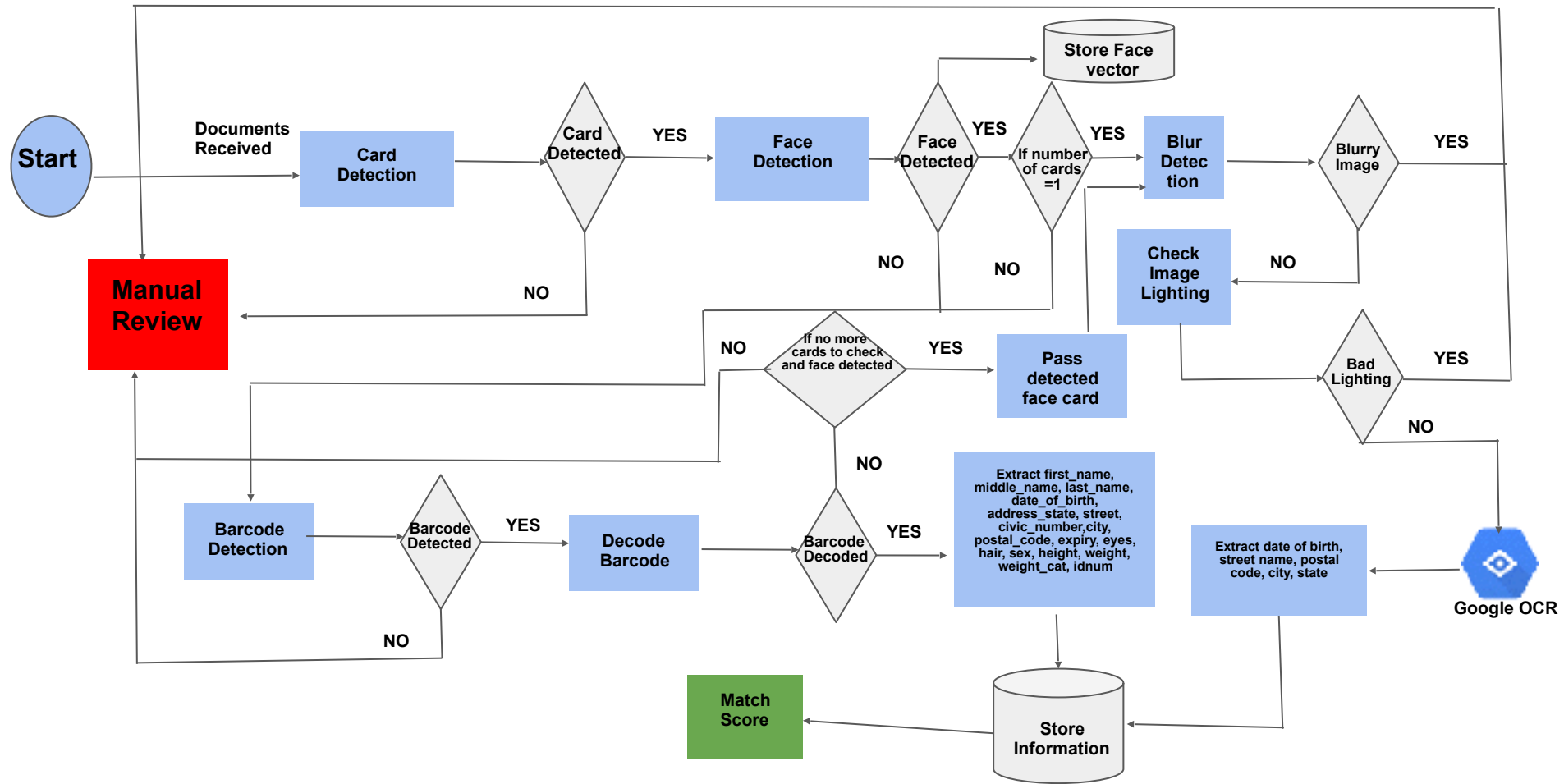
Additional Work - Convolutional Neural Network

Advantages

- Excellent Performance to detect if a card is cropped, handheld, bad lighting, blurred

Issues

- Trained on South American Driver Licenses
- Average Performance on Canadian Licenses
- Data augmentation with GANs



Demo

Card



Captured Information

first_name	middle_name	last_name	data_of_birth	address_state	street	civic_number	city	postal_code
samantha	nicole	reid	1991-04-21	ON	tindale rd	16	BRAMPTON	L6V 2G9

expiry	eyes	hair	sex	height	weight	weight_cat	idnum	text	cardtype_id	face_vector
2020-07-21	NONE	None	2	160	None	None	R2256-68769-15421	None	1	[-0.10900473594685527, -0.013325408101081848, ...]

Application

id	contact_id	cat	civic_number	street	city	postal_code	id	first_name	middle_name	last_name	date_of_birth
16793	33257	1	16	Tindale Rd	Brampton	L6V 2G9	33257	Samantha		Reid	1991-04-21

Banking

contact_id	postal_code	city	name	street	province	first_name	middle_name	last_name	civic_number
33257	L6V 2G9	BRAMPTON	[SAMANTHA, None, REID]	TINDALE RD	ON	SAMANTHA	None	REID	16

Credit Bureau

city	postal_code	province	street	civic_number	cat	date_of_birth	first_name	last_name	middle_name	contact_id
BRAMPTON	L6V 2G9	ON	TINDALE RD APT	16	ca	1991-04-21	SAMANTHA	REID	N	33257
EAST YORK	M4K 2E9	ON	COSBURN AVE APT 101	55	fa	1991-04-21	SAMANTHA	REID	N	33257
TORONTO	M4K 2E9	ON	COSBURN AV APT 101	55	f2	1991-04-21	SAMANTHA	REID	N	33257

Sample Json Results

```
"city": {
  "app": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "banking": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "credit": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "doc": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  }
},

"civic": {
  "app": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "banking": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "credit": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "doc": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  }
},

"contact_id": 33257, "last_name": {
  "app": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "banking": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "credit": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "doc": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  }
},

"match_address": {
  "app": {
    "app": "ca",
    "banking": 1,
    "credit": "ca",
    "doc": 1
  },
  "banking": {
    "app": 1,
    "banking": "ca",
    "credit": "ca",
    "doc": "ca"
  },
  "credit": {
    "app": "ca",
    "banking": "ca",
    "credit": "ca",
    "doc": "ca"
  },
  "doc": {
    "app": 1,
    "banking": "ca",
    "credit": "ca",
    "doc": "ca"
  }
},

"middle_name": {
  "app": {
    "app": 100,
    "banking": 0,
    "credit": -1,
    "doc": -1
  },
  "banking": {
    "app": 0,
    "banking": 100,
    "credit": -1,
    "doc": -1
  },
  "credit": {
    "app": -1,
    "banking": -1,
    "credit": 100,
    "doc": 29
  },
  "doc": {
    "app": -1,
    "banking": -1,
    "credit": 29,
    "doc": 100
  }
},

"postal_code": {
  "app": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "banking": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "credit": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "doc": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  }
},

"street": {
  "app": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "banking": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "credit": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  },
  "doc": {
    "app": 100,
    "banking": 100,
    "credit": 100,
    "doc": 100
  }
},

"dob": {
  "app": {
    "app": 100,
    "banking": 0,
    "credit": 100,
    "doc": 100
  },
  "banking": {
    "app": 0,
    "banking": 100,
    "credit": 0,
    "doc": 0
  },
  "credit": {
    "app": 100,
    "banking": 0,
    "credit": 100,
    "doc": 100
  },
  "doc": {
    "app": 100,
    "banking": 0,
    "credit": 100,
    "doc": 100
  }
}
```

Demo

	app	banking	credit	doc
app	100	100	99	100
banking	100	100	99	100
credit	99	99	100	99
doc	100	100	99	100

Address Proof

- 1) Able to match address and name to Address Proof

Address Proof

Miss Meagan A Newton
1011 Simcoe St N
APT 8
Oshawa ON L1G 4W3



How to authenticate?

