AI : Security and Retail

A case study on the emergence of artificial intelligence in security and retail domain.

“When they say AI is just if-else statements, disagree in your natural brain and just move on

—-3 Layer Neural Network

What’s it all about!

01 Current Situation in AI

What are the current market trends for the AI domain and it’s future.

02 AI in Security

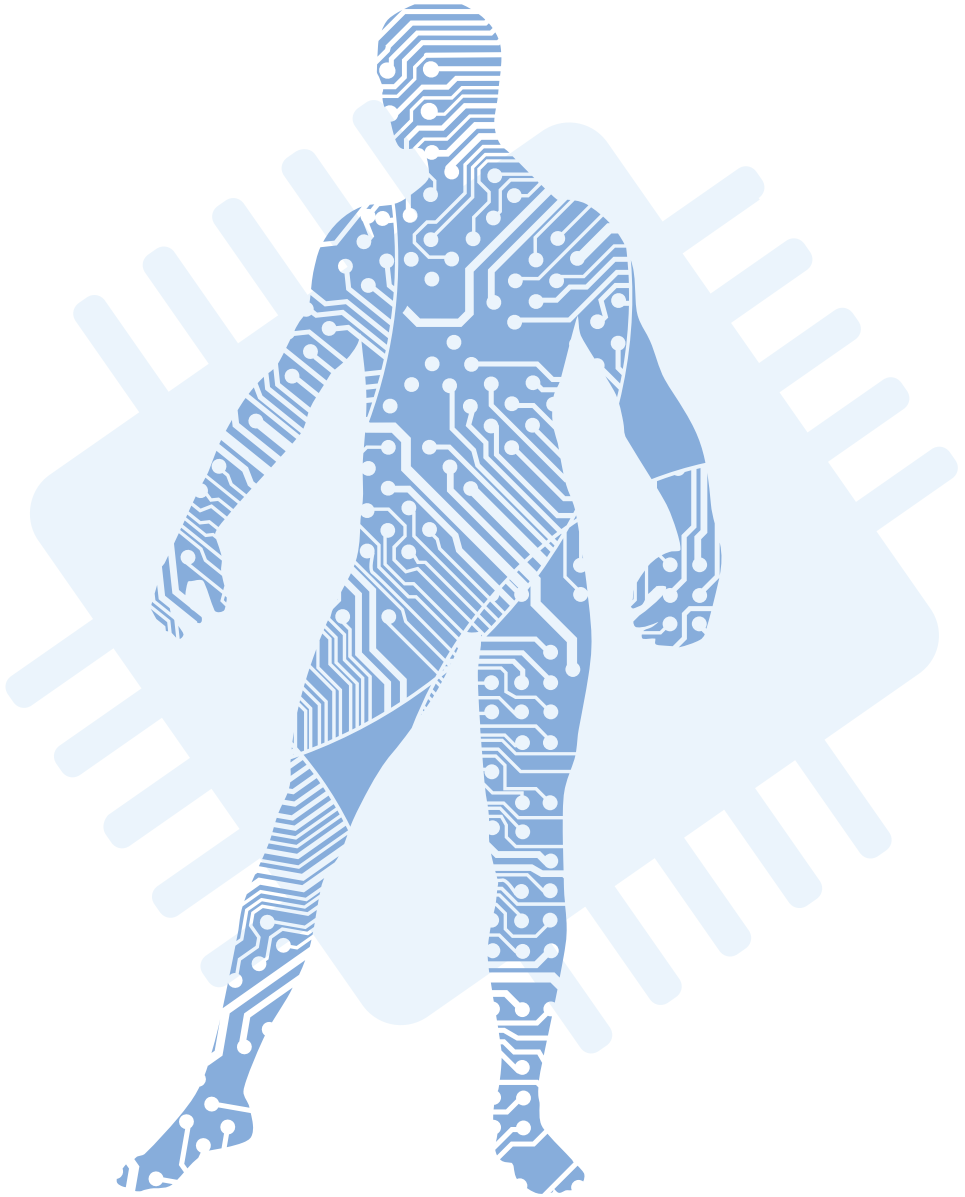
How AI is enabling smart physical and virtual security around town.

03 AI in Retail

Buying something? Get customized as your shopping behavior is going to change.

04 AI for Education

Who is going to build it all and how should you create the data scientists of the future.



Artificial Intelligence :

The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

- Wikipedia

A.I. TIMELINE

1950
TURING TEST
Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

1955
A.I. BORN
Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

1961
UNIMATE
First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line

1964
ELIZA
Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans

1966
SHAKEY
The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions

A.I. WINTER
Many false starts and dead-ends leave A.I. out in the cold

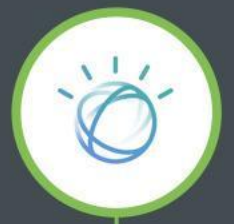
1997
DEEP BLUE
Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov

1998
KISMET
Cynthia Breazeal at MIT introduces KISmet, an emotionally intelligent robot insofar as it detects and responds to people's feelings

1999
AIBO
Sony launches first consumer robot pet dog AiBO (AI robot) with skills and personality that develop over time

2002
ROOMBA
First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes

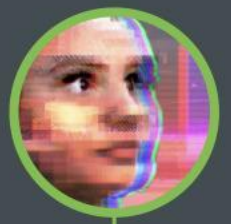
2011
SIRI
Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S



2011
WATSON
IBM's question answering computer Watson wins first place on popular $1M prize television quiz show *Jeopardy*

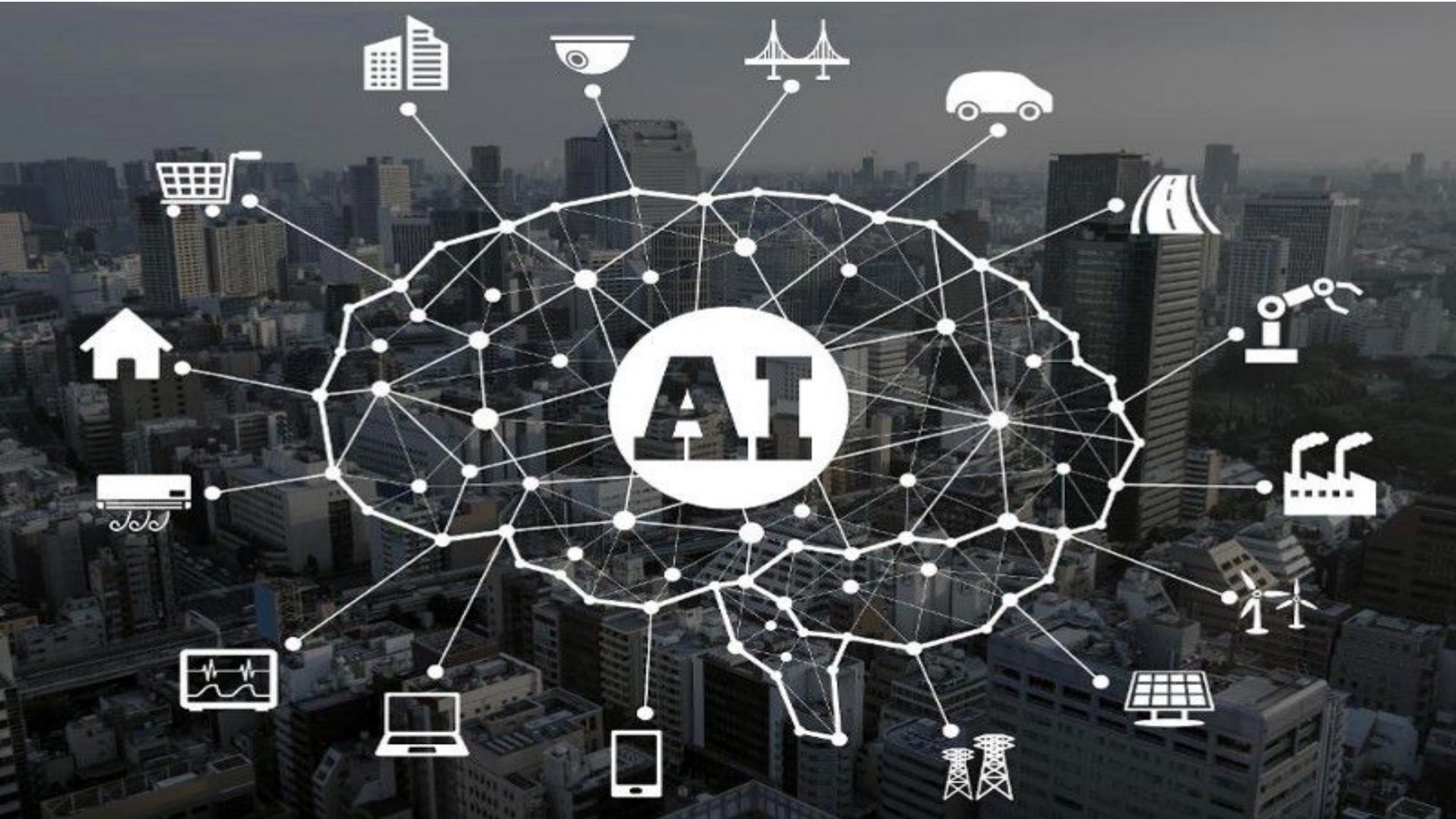
2014
EUGENE
Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human

2014
ALEXA
Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks



2016
TAY
Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments

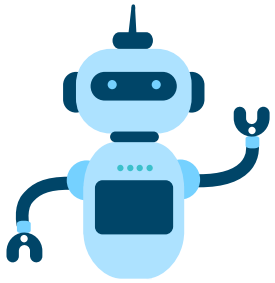
2017
ALPHAGO
Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number (2^{170}) of possible positions


AI

Current Situation : THE STAGE HAS BEEN SET

1

Chatbots and NLP



2

Computer Vision Systems deployed at scale by governments and organizations.

3

Autonomous systems : Vehicles, Robotic Automation etc.

4

Improved analytics and better customer spending due to targeted advertising.

5

Enhanced and Open Source large datasets .

Reference : The basics you can find anywhere 5 Steps To Successful Storytelling Published on April 5, 2014 Featured in: Marketing & Advertising

Industry 1.0

Mechanical production equipment, steam and water power

Industry 2.0

Electricity, mass production, assembly line

Industry 3.0

Computers and automated production

Industry 4.0

Cyber-physical systems

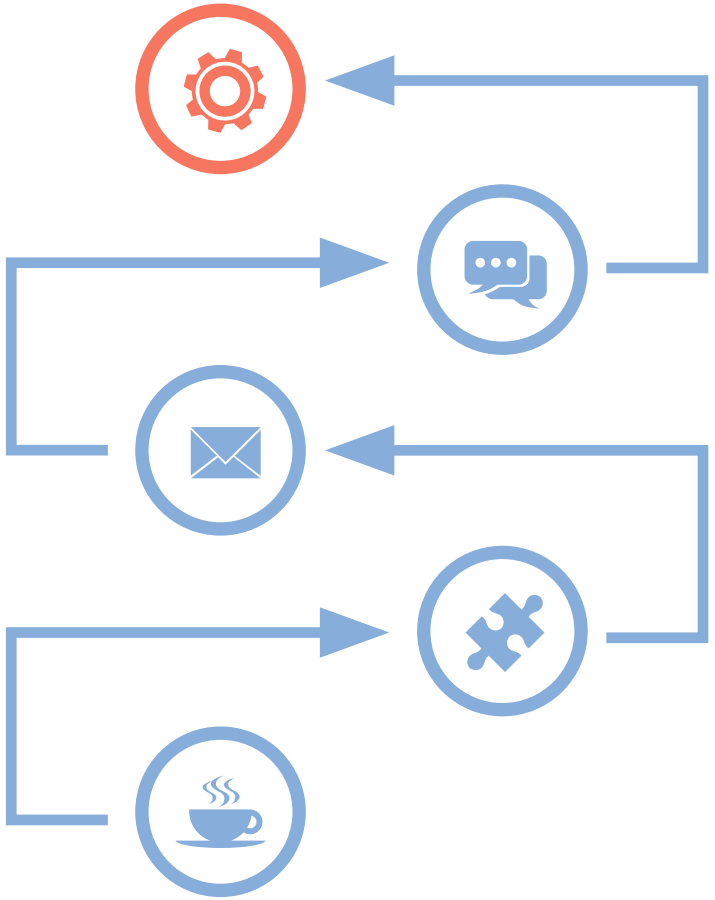
AI in Retail

Analytics

Use the intelligence of the designed algorithms and speed of the machines to deliver real-time and actionable statistics.

Decisions and Inputs

Data Scientists and potential customers sit together to formulate best possible inputs and outcomes that are desirable in the deployment phase for analytics.



Customer centric

All the available data is then generalized towards the audience based on age, gender context which improves the overall customer experience making his tasks easier.

Design and development

Pool of data scientists sit together and decide the KPIs that will drive the algorithms and a best possible way to achieve it.

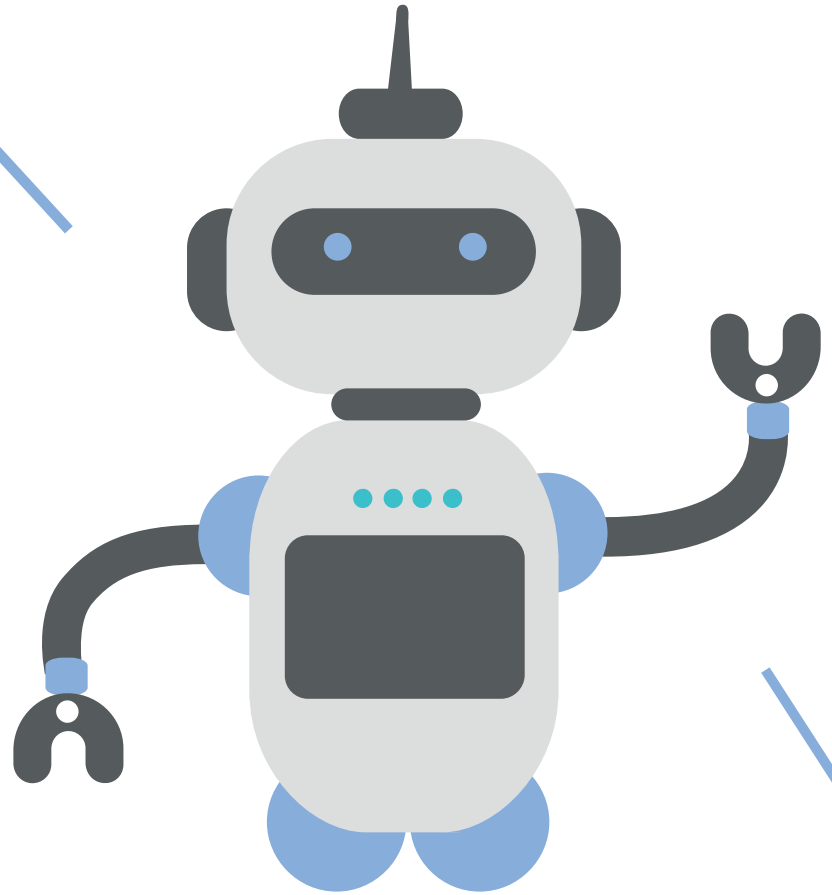
Shopping the AI way

- Assisting Robots
- Followers
- Shelfers
- IoT Sensors
- Computer Vision
- Wi-Fi and I beacon technology
- Customer data

AI in Security

Intelligent Camera network

CCTV's now come equipped with facial , motion and gesture recognition to have the complete circle when it comes to personal security.

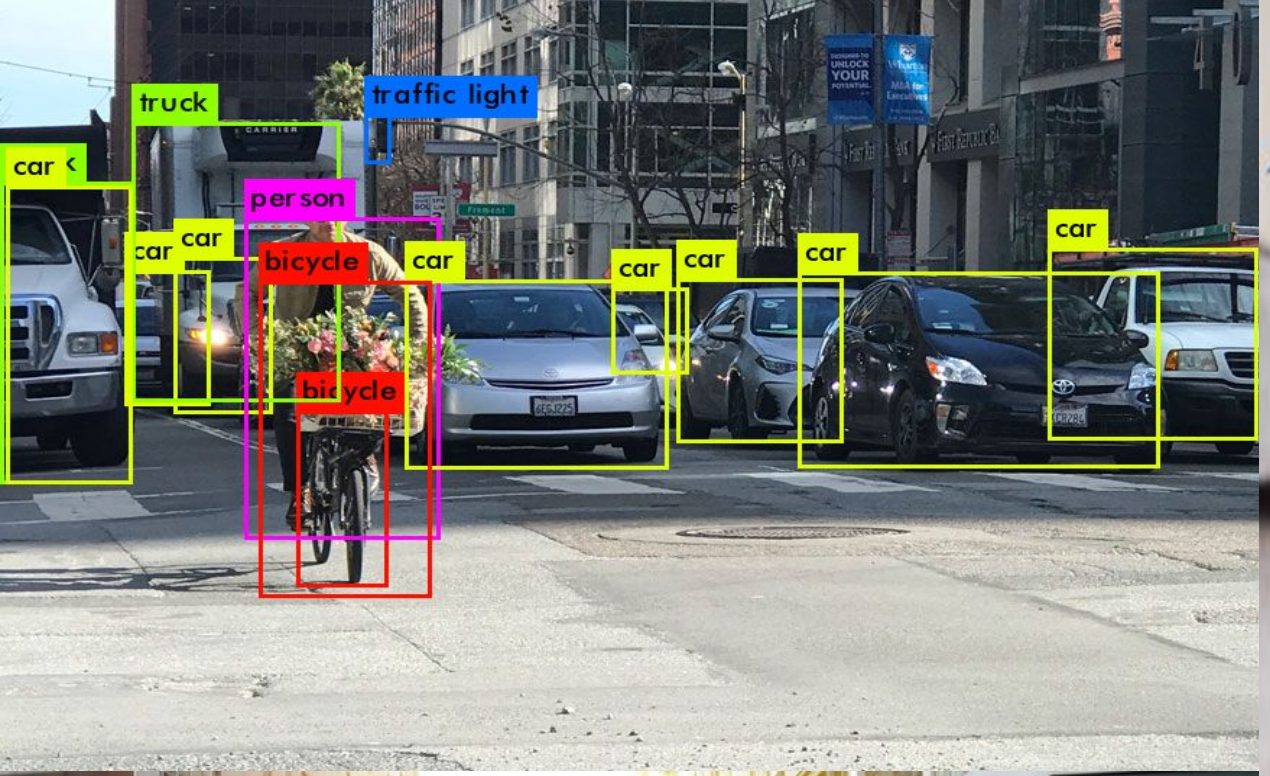


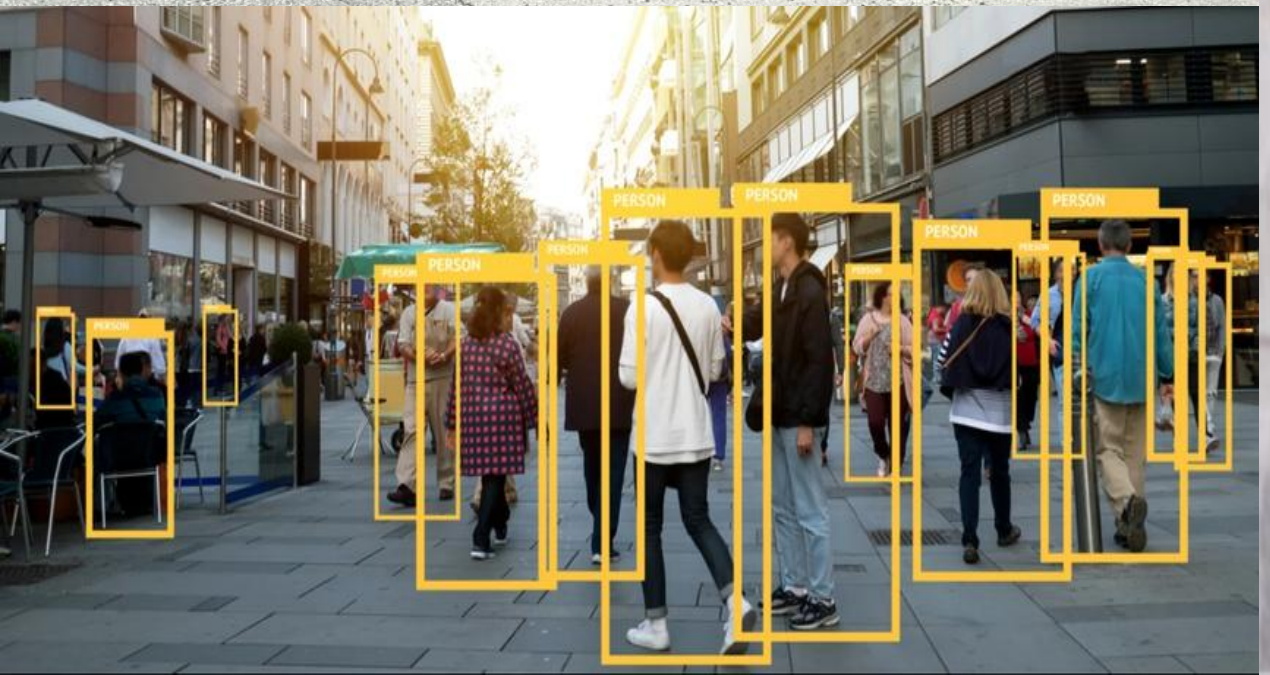
Asset Security

Cyber Security

Behavioral Neural Networks

Cyber attacks mostly occur in certain patterns that can be picked up by trained neural networks.


truck
traffic light
car
person
car
car
bicycle
car
car
car
car
car
bicycle


PERSON
PERSON
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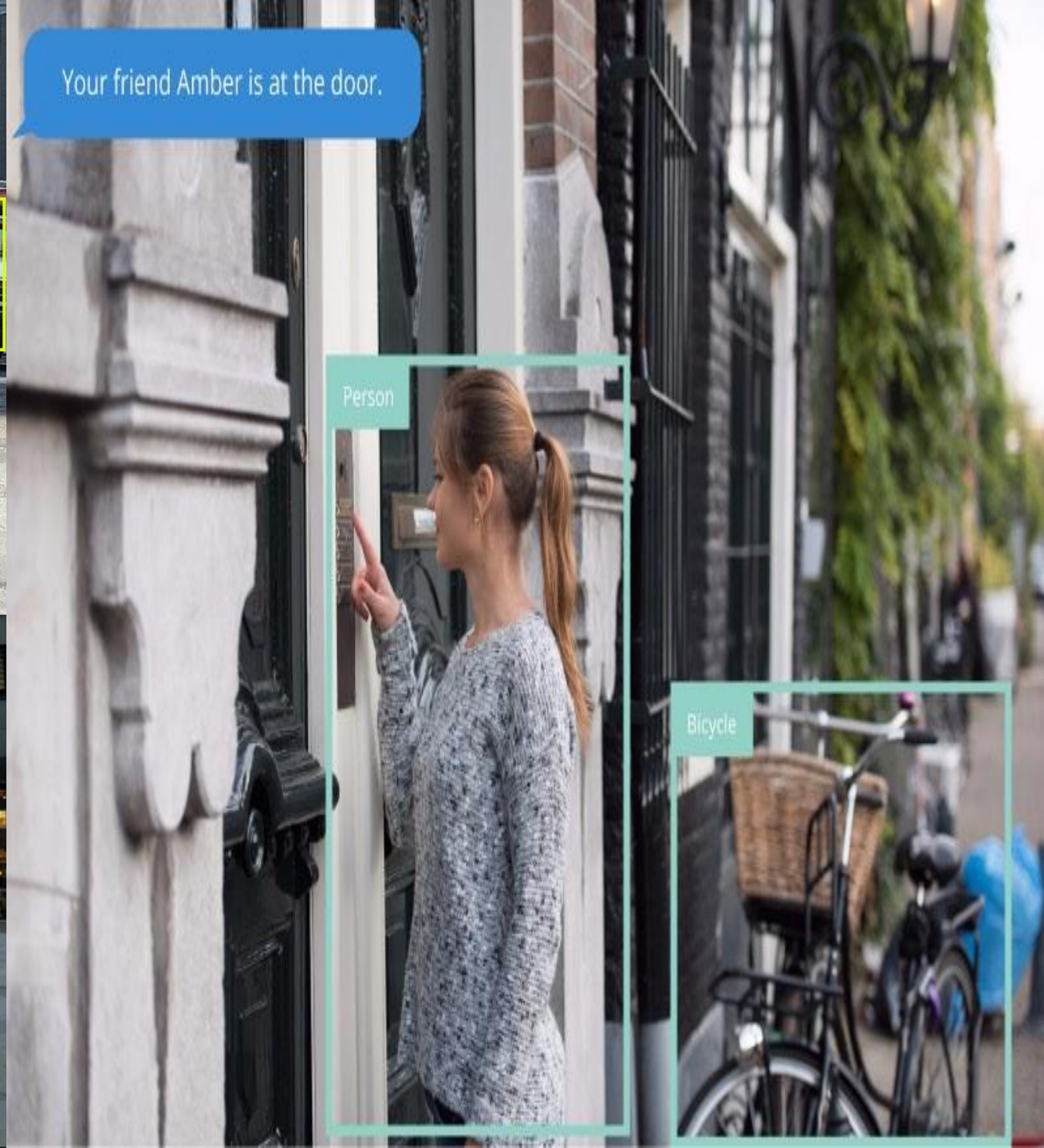
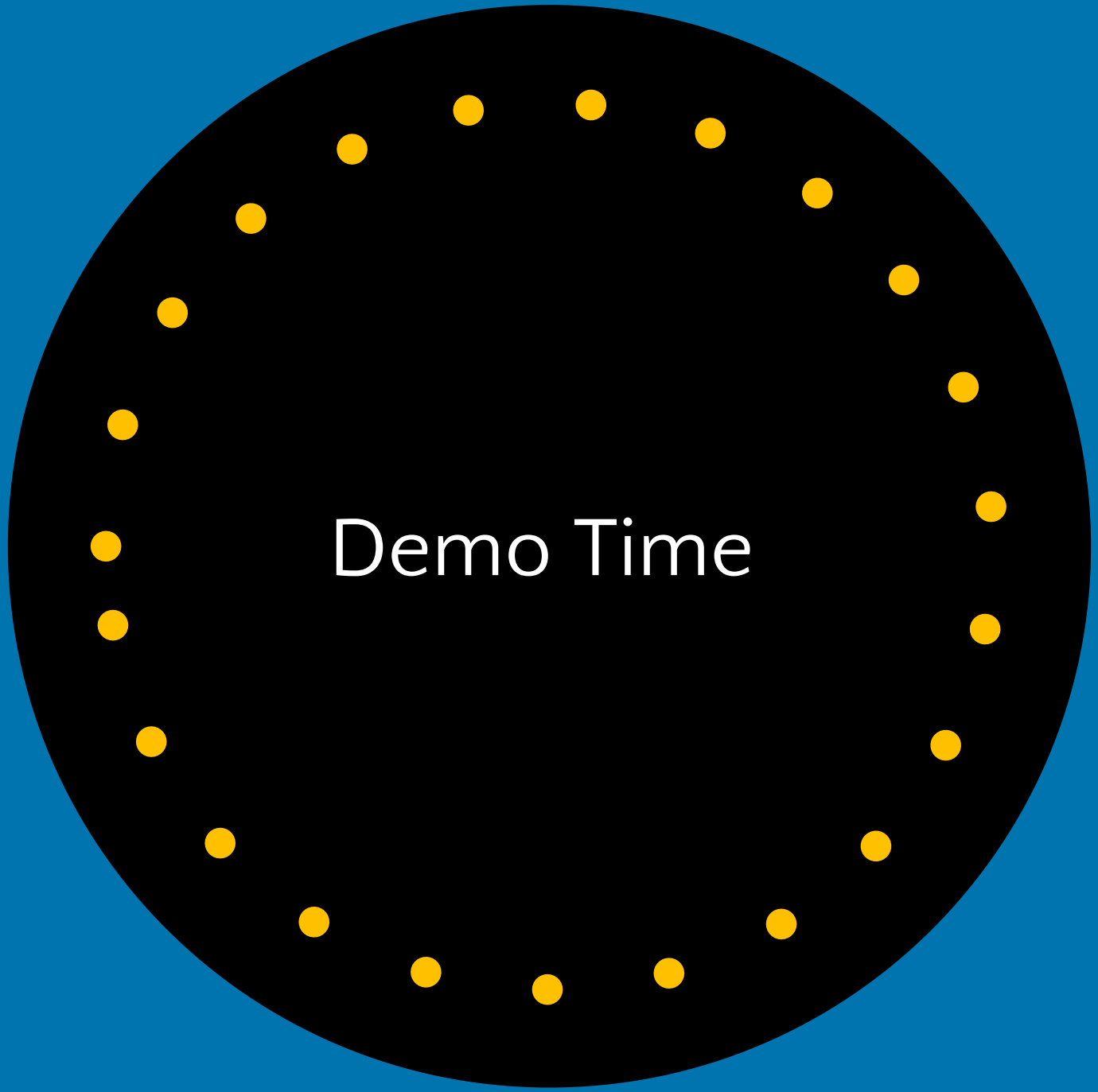
PERSON


Your friend Amber is at the door.
Person
Bicycle


Let’s walk the Talk


Demo Time

EXPLORER

OPEN EDITORS
- face_recognize.py 1

PRECOG-HOME-RETAIL
- database
- facenet
- unrecognized
- 39.png.png
- 20181026-120142.png
- 20181031-113624.png
- 20181130-101403.png
- 20181130-102214.png
- 20181130-103349.png
- box.py
- create_database.py
- face_det_recog.py
- face_recognize.py 1
- face-recog.py
- facerecogemail.py
- haarcascade_frontalface_default.xml
- ISSUE_TEMPLATE.md
- LICENSE
- README.md

OUTLINE

face_recognize.py

face_recognize.py ▸ ...

```
9
10  Model Retraining.
11
12  Facial Data Segmentation.
13
14  '''
15
16  import cv2, sys, numpy, os, smtplib
17  size = 4
18  haar_file = 'haarcascade_frontalface_default.xml'
19  datasets = 'database'
20  # Part 1: Create fisherRecognizer
21  print('Training...')
22  # Create a list of images and a list of corresponding names
23  (images, lables, names, id) = ([], [], {}, 0)
24  for (subdirs, dirs, files) in os.walk(datasets):
25      for subdir in dirs:
26          names[id] = subdir
27          subjectpath = os.path.join(datasets, subdir)
28          for filename in os.listdir(subjectpath):
29              path = subjectpath + '/' + filename
30              lable = id
31              images.append(cv2.imread(path, 0))
32              lables.append(int(lable))
33          id += 1
34  (width, height) = (112, 92)
35  #(width, height) = (130, 100)
36  # Create a Numpy array from the two lists above
37  (images, lables) = [numpy.array(lis) for lis in [images, lables]]
38
39  # OpenCV trains a model from the images
40  # NOTE FOR OpenCV2: remove '.face'
41  model = cv2.face.FisherFaceRecognizer_create()
42  model.train(images, lables)
43
44  # Part 2: Use fisherRecognizer on camera stream
45  face cascade = cv2.CascadeClassifier(haar file)
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL

Code

```
Training...
Traceback (most recent call last):
  File "/home/cynaptoashwin/Videos/precog-home-retail/face_recognize.py", line 42, in <module>
    model.train(images, lables)
cv2.error: OpenCV(3.4.2) /io/opencv/modules/core/src/lda.cpp:1075: error: (-5:Bad argument) At least two classes are needed to perform a LDA. Reason: Only one class was given! in function 'lda'


[Done] exited with code=1 in 0.241 seconds

[Running] python -u "/home/cynaptoashwin/Videos
```

SimpleScreenRecorder

Recording

Start recording

Activities SimpleScreenRecorder Mon 11:18

File Edit Selection View Go Debug Terminal Help video_emotion_color_demo.py - Visual Studio Code

EXPLORER

OPEN EDITORS 1 UNSAVED
- predictkerasvideo.py ...
- predictkeras.py ~/Doc...
- emotion-program.py ...
- train.py ~/Documents/k...
- index.html ~/Documen...
- video_emotion_color_...
- sample-motion-cr... 1
- style.css ~/Documents/...

NO FOLDER OPENED

You have not yet opened a folder.

Open Folder

OUTLINE

predictkerasvideo.py | predictkeras.py | emotion-program.py | train.py | index.html | video_emotion_color_demo.py | sample-motion-creator.py | style.css

emotion_probability Aa Abl .* 1 of 10

```
67            emotion_mode = mode(emotion_window)
68        except:
69            continue
70
71        if emotion_text == 'angry':
72            color = emotion_probability * np.asarray((255, 0, 0))
73            print('Angry Probability : ' + str(emotion_probability))
74        elif emotion_text == 'sad':
75            color = emotion_probability * np.asarray((0, 0, 255))
76            print('Sad Probability : ' + str(emotion_probability))
77        elif emotion_text == 'happy':
78            color = emotion_probability * np.asarray((255, 255, 0))
79            print('Happy Probability : ' + str(emotion_probability))
80        elif emotion_text == 'surprise':
81            color = emotion_probability * np.asarray((0, 255, 255))
82            print('Surprise Probability : ' + str(emotion_probability))
83        else:
84            color = emotion_probability * np.asarray((0, 255, 0))
85
86        color = color.astype(int)
87        color = color.tolist()
88        #font_scale=3, thickness=3
89        draw_bounding_box(face_coordinates, rgb_image, color)
90        draw_text(face_coordinates, rgb_image, emotion_mode,
91                  color, 0, -45, 3, 3 )
92
93
94    bgr_image = cv2.cvtColor(rgb_image, cv2.COLOR_RGB2BGR)
95
96    cv2.imshow('window_frame', bgr_image)
97    video_write.write(bgr_image)
98    if cv2.waitKey(1) & 0xFF == ord('q'):
99       # break
100       cv2.destroyAllWindows()
101       video_write.release()
102
103
104
```

cynaptoashwin@localhost:~/Videos/face_classification/src

File Edit View Search Terminal Help

```
Sad Probability : 0.611305
Sad Probability : 0.53950506
Sad Probability : 0.63537747
Sad Probability : 0.6607763
Sad Probability : 0.67892826
Sad Probability : 0.62101084
Sad Probability : 0.43955737
Sad Probability : 0.5349113
Sad Probability : 0.4600915
Sad Probability : 0.57947236
q
^[^CTraceback (most recent call last):
  File "video_emotion_color_demo.py", line 44, in <module>
    faces = detect_faces(face_detection, gray_image)
  File "/home/cynaptoashwin/Videos/face_classification/src/utils/inference.py",
line 15, in detect_faces
    return detection_model.detectMultiScale(gray_image_array, 1.3, 5)
KeyboardInterrupt
[cynaptoashwin@localhost src]$ python video_emotion_color_demo.py
Using TensorFlow backend.
2019-01-07 11:18:30.100686: I tensorflow/core/platform/cpu_feature_guard.cc:141]
 Your CPU supports instructions that this TensorFlow binary was not compiled to
use: AVX2 FMA
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL Tasks

SimpleScreenRecorder

Recording

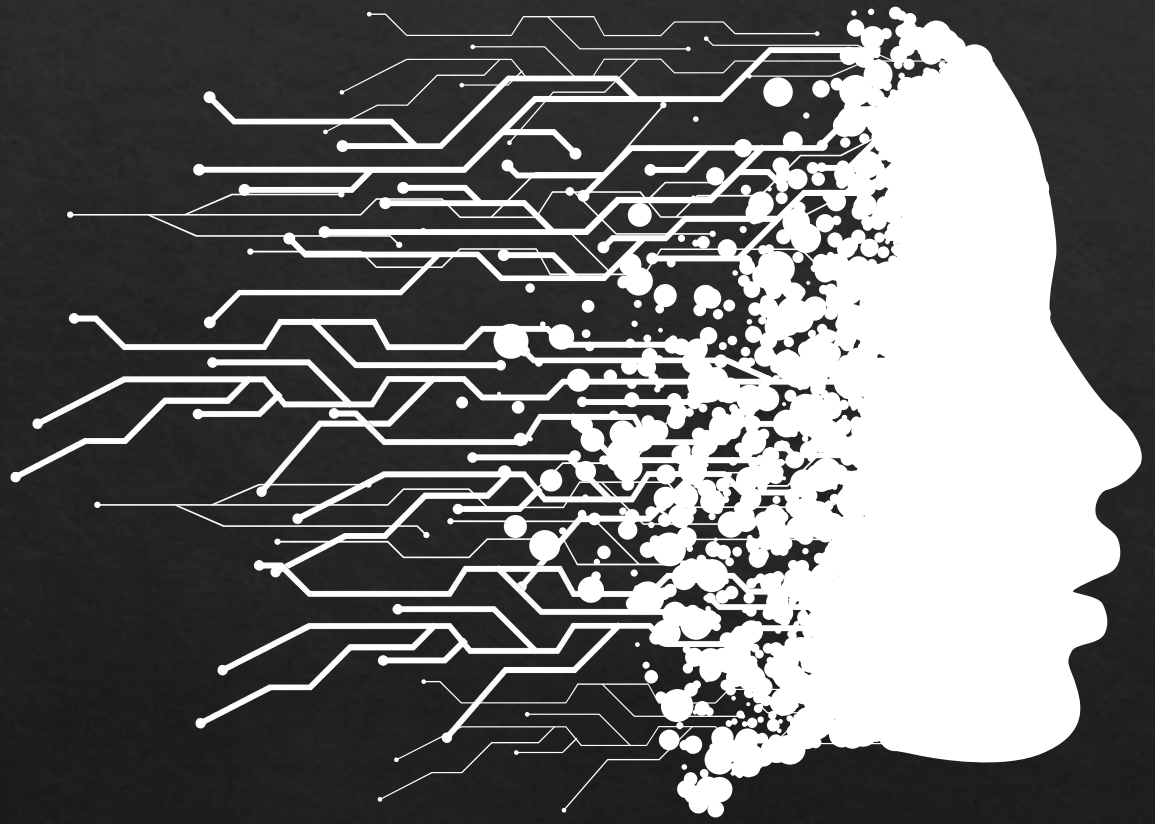
Start recording

Enable recording hotkey Enable sound notifications

Python 2.7.15 64-bit 0 1 Ln 91, Col 33 Spaces: 4 UTF-8 LF Python 1

Where are ‘your’ skills in this>?

“The most important factor is not how you acquire* the skills, it’s how you implement them”



Thank You

Questions, Suggestions always welcomed.

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Contact : +919403789106