This document provides the abstract for the problem statements for HackOverFlow, The Data Science Hackathon to be held at IIT Guwahati

Challenges - 2018

The Data Science & IoT Challenge

The Probyto at TIC, IIT Guwahati is an industry-focused technology center for the development and deployment of data science and analytics technology solutions as per industry requirements. Focusing majorly on developing tools and algorithms, innovative techniques and transforming technologies that enable organizations to use data for better decision making.

The primary outputs are prototypes, along with state-of-the-art reviews of data analytics technology, tools, best practice methodologies and processes. Each of the project that we deliver each year produces:

- A technology and competitive state-of-the-art review.
- Technical specification agreed with industry partners.
- A technology prototype within six months of project start.
- On-premise evaluation report of prototypes with the assistance from industry member

The center will be maintaining an extensive catalogue of prototypes, intellectual properties and analytics technology assessments, which are immediately available for evaluation.

HackOverFlow, The Data Science Hackathon is event conducted by Matrix, The Student body of Department of Mathematics, IIT Guwahati and Consulting & Analytics Club, IIT Guwahati. The event is sponsored by Probyto with the objective of

- Building greater awareness about Data Science, TIC incubation centre and start-up ecosystem in Guwahati/NE
- Potential product idea to be nurtured in incubation and with help of industry
- Opportunity for students and faculty to interact with Data Science industry professionals

This document list down the problem statements proposed to the participants and potential end users. This document is sole property of Probyto and should only be used by Organizers for agreed intended purpose.

Table of Contents

Challenge 1 / Geo-Spatial Analysis for flood warnings in Assam

Background
According to an assessment made by Rashtriya Barh Ayog, an area of 31,500 sq km of Assam is flood prone. That means 39.58 per cent of the State's total land is prone to floods. The assessment was made through Updated Flood Hazard Atlas. for Assam State prepared by the National Remote Sensing Centre of the ISRO. The Atlas was released on Tuesday. From 1998-2015, as much as 28.75 per cent (22.54 lakh hectares) of the land has been affected in Assam due to floods. Out of this area, about 1.55 lakh hectares of land falls under high to very high flood hazard categories.

Challenge
Using satellite imagery, can you create an application which can generate flood warnings and help disaster management efforts?

Target Users
State Government, Disaster Management, Public, Media and NGOs

Few resources to refer for more details:

1. https://www.geospatialworld.net/blogs/iwmi-provides-rapid-emergency-response-maps-bihar-assam-floods/
2. https://www.isro.gov.in/updated-flood-hazard-atlas-assam-state
3. http://www.tandfonline.com/doi/full/10.1080/19475705.2017.1408705
4. http://civil.iisc.ernet.in/~nagesh/rs_docs/21_RS_GIS_DEM_Floods_bw.pdf

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Challenge 2/ CYBER SECURITY

Background
Google is using machine learning to analyze threats against mobile endpoints running on Android -- as well as identifying and removing malware from infected handsets, while cloud infrastructure giant Amazon has acquired start-up harvest.AI and launched Macie, a service that uses machine learning to uncover, sort and classify data stored on the S3 cloud storage service.

Simultaneously, enterprise security vendors have been working towards incorporating machine learning into new and old products, largely in a bid to improve malware detection. “Most of the major companies in security have moved from a purely “signature-based” system of a few years ago used to detect malware, to a machine learning system that tries to interpret actions and events and learns from a variety of sources what is safe and what is not,” says Jack Gold, president and principal analyst at J. Gold Associates. “It’s still a nascent field, but it is clearly the way to go in the future. Artificial intelligence and machine learning will dramatically change how security is done.”

Challenge
Can you use deep learning methods to analyse network traffic and spot an anomaly behavior?

Target Users
Governments, Network Administrators, ISPs, Public and Corporates

Few resources to refer for more details:

1. https://www.computerworld.com.au/article/631162/5-top-machine-learning-use-cases-security/
2. https://www.wireshark.org/
3. https://github.com/jivoi/awesome-ml-for-cybersecurity

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Challenge 3/ Converting Paper forms to Digital using Machine Learning (RPA)

Background
Robotic process automation (RPA) is the application of technology that helps company to configure systems to capture, interpret and make decision for low level tasks such as scheduling, monitoring, data entry and many more. RPA are typically set of methodologies and processes to automate lower level jobs based on certain rules.

One of the applications of RPA is helping companies to digitize their paper based forms and documents. With advent of technology and competent business environments, it is important for companies to have all their information in digital format while the business process still relies on paper-based assets. OCR machines are costly and come along with hardware. The advent in machine learning efforts can turn any scanned copy of such assets into digital form.

Challenge
Can you use machine learning and develop an application to capture information from variety of forms, receipts and do a reconciliation of records?

Target Users
Telecom. Insurance, Tax Consultants, Governments and Administrators

Few resources to refer for more details:

1. http://www.cvisiontech.com/resources/ocr-primer/ocr-neural-networks-and-other-machine-learning-techniques.html
2. https://blogs.dropbox.com/tech/2017/04/creating-a-modern-ocr-pipeline-using-computer-vision-and-deep-learning/
3. https://hackernoon.com/latest-deep-learning-ocr-with-keras-and-supervisely-in-15-minutes-34aecd630ed8

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Challenge 4/ Analysing the pathological slide for blood analysis

Background

Medical diagnosis is one of the important prerequisite for prescribing medicines and planning treatment. Diagnostic involve analyzing multimedia output of pathology test, X-rays, ultrasounds, ECGs and many other tests. Artificial Intelligence can be used in an assistive manner to help analyze the multimedia output quickly and more effectively. One of the recent areas of AI application in medical diagnostics is in pathology test for analysis like counting of RBC & WBC cells, detecting foreign body, thickness, shape and many more. Image analysis techniques developed using deep learning algorithms have shown promise to do these tasks efficiently and increase productivity of pathologist.

A simple use case will involve analyzing a blood sample slide for detecting presence of any foreign body in the blood. The standard process involves analyzing slides manually by pathologist looking into the tiny eye-piece of a microscope, which is tedious & error prone. For any AI based system to assist in this job it includes two main components, one a device to capture the slide content as a high resolution image and second an AI algorithm to assist the pathologist to analyze the output. The device will capture an image and send it to a cloud for storage. The images will then be sent to an API for analysis and returns an automatic report to pathologist.

Challenge

Can you build a Computer Vision based application to analyse pathological blood sample?

Target Users

Pathology Labs, Clinics and Healthcare service providers

Few resources to refer for more details:

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3996871/
2. http://www.virtualpathology.leeds.ac.uk/research/analysis/
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5556681/
4. https://blog.athelas.com/classifying-white-blood-cells-with-convolutional-neural-networks-2ca6da239331

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Location: IIT Guwahati

Challenge 5/ Smart contracts using Blockchain

Background
“The blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value.” - Don & Alex Tapscott, authors Blockchain Revolution (2016)

Blockchain a technology innovation which have built in robustness by storing blocks of information that are identical across its network. The Blockchain can’t be controlled by a single entity and has no single point of failure. Cryptocurrency is the most popular use case of Blockchain technology. The technology stack to implement Blockchain is also evolving with major technologies being Etherium, Hyperleadger and others. The investment in this technology shows the potential impact it will have in coming future.

Challenge
Can you build a platform for smart contracts between two parties using blockchain?

Target Users
Small Medium Enterprises, Royalties in Music and creative industry, contract enforcement agencies and Governments

Few resources to refer for more details:

1. https://medium.com/crypto-currently/build-your-first-smart-contract-fc36a8ff50ca
2. https://arxiv.org/pdf/1709.10000.pdf
3. https://blog.zeppelin.solutions/the-hitchhikers-guide-to-smart-contracts-in-ethereum-848f08001f05

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Location: IIT Guwahati

Challenge 6/ Creative writing assisted by AI driven virtual assitant

Background
A good creative writing requires lot of past experience and wit to create a master piece. With growing size of literature and user contributed contents the writers sometime lose the touch from real world driven by social media and dynamic social changes and struggle to corroborate their ideas into creative writing. AI is being able to churn millions of creative writing, in turn helping writer with perspectives to write new content inspired by past works of great writers.

It is really great to see a machine learning model that could generate with high accuracy text that resembles Shakespeare, Wikipedia, Harry Potter, Obama speeches, Star Wars episodes, and ultimately even write programming code. Once you collect enough data it is possible to train a charter-level Recurrent Neural Network (RNN). Microsoft made available a script to train a neural char-level language model to predict the next character after a sequence of characters. Finally, we will test if the network is able to complete sentences with creative use of vocabulary.

Challenge
Can you build a machine learning application to churn thousands of creative work and help new creative writers to leverage the past work?

Target Users
Small Medium Enterprises, Royalties in Music and creative industry, contract enforcement agencies and Governments

Few resources to refer for more details:

1. https://medium.com/intuitionmachine/writing-travel-blogs-with-deep-learning-9b4a6fbcc87
2. https://medium.com/inside-machine-learning/artificial-creativity-347b7c20a5a1

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Location: IIT Guwahati

Challenge 7/ IoT based weather monitoring system

Background
Weather forecasting has gained attention of many researchers due to its effect on human life and livelihood. Weather monitoring plays an important role in human life, so the collection of information about the temporal dynamics of weather changes is very important. In any industry during certain hazards it is very important to monitor weather. The aim of IoT based system is to develop an embedded system to design a weather monitoring system which enables the monitoring of weather parameters in an industry/field remotely. Such a system contains pair of sensors like temperature, light, humidity etc and data transmission module for data upload to clouds.

Challenge
Can you build a machine learning application to churn thousands of creative work and help new creative writers to leverage the past work?

Target Users
Agriculture, Food Processing, Utilities, Cold Storage, Weather/geo-spatial forecasting, disaster management agencies

Few resources to refer for more details:

1. http://nevonprojects.com/iot-weather-reporting-system/
2. https://www.ijarcce.com/upload/2016/september-16/IJARCCE%2066.pdf
3. http://ijesc.org/upload/c1ad40d536ccca051ff4af59252ab9d6.Smart%20City%20IoT%20Based%20Weather%20Monitoring%20System.pdf

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Challenge 8/ IoT Based Air Quality Monitoring

Background
Indoor air quality and its real-time information is critical for maintaining human health and productivity. According to Environmental Protection Agency (EPA)2, indoor air even in centrally air-conditioned buildings is several times more polluted than outdoor air, primarily due to change in occupancy pattern, poor, old or ill maintained ventilation systems, dust, and presence of volatile organic compounds. Hence, it is necessary for humans to pervasively and ubiquitously measure air quality information in real time, specially whose health is sensitive to poor indoor air.

Challenge
Can you build a context aware Android smart phone based mobile adhoc sensing system that senses various data from indoor environment around the user and analyses it in real time, thereby helping to maintain good health and better work productivity?

Target Users
Hospitals, Households, Offices, Industrial Units, Academic campuses and others indoor places

Few resources to refer for more details:

1. http://www.kscst.iisc.ernet.in/spp/39_series/SPP39S/02_Exhibition_Projects/190_39S_BE_0501.pdf
2. https://circuitdigest.com/microcontroller-projects/iot-air-pollution-monitoring-using-arduino
3. https://itra.medialabasia.in/data/Documents/HumanSense/publications/SmartVent%20A%20Context%20Aware%20IoT%20System%20to%20Measure%20Indoor%20Air%20Quality%20%20and%20Ventilation%20Rate.pdf

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Location: IIT Guwahati

Challenge 9/ Chatbot assistant for Tourism in North East

Background
A chat bot is a digital service that can hold natural sounding conversations with human beings with the aim of accomplishing tasks, such as answering questions or enabling product purchases. Powered by a set of simple rules and varying degrees of AI, these bots converse with real people via messaging apps such as Facebook Messenger and Telegram. Though the technology is maturing fast, the use cases still drives the value it creates for its stakeholders.

As players in a competitive field, travel agencies, hotel booking services, and other businesses built around travel and tourism need to keep assessing their offerings to make sure that they draw and retain enough customers. With travel chatbot development, they can do that and more.

Challenge
Can you develop a chatbot which can help tourists know more about Assam and North East?

Target Users
Travel agencies, hotel booking services, and other businesses built around travel and tourism

Few resources to refer for more details:

1. https://chatbotsmagazine.com/travel-chatbot-how-chatbots-can-help-city-tourism-a2f122c0896d
2. https://medium.com/@onlim_com/chatbots-alexa-co-in-the-tourism-industry-8f8fe0d95662
3. https://blogs.msdn.microsoft.com/uk_faculty_connection/2017/09/08/how-to-build-a-chat-bot-using-azure-bot-service-and-train-it-with-luis/

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Location: IIT Guwahati

Challenge 10/ Alexa or Google based chatbot assistant for Primary education

Background
A chat bot is a digital service that can hold natural sounding conversations with human beings with the aim of accomplishing tasks, such as answering questions or enabling product purchases. Powered by a set of simple rules and varying degrees of AI, these bots converse with real people via messaging apps such as Facebook Messenger and Telegram. Though the technology is maturing fast, the use cases still drives the value it creates for its stakeholders.

As players in a competitive field, travel agencies, hotel booking services, and other businesses built around travel and tourism need to keep assessing their offerings to make sure that they draw and retain enough customers. With travel chatbot development, they can do that and more.

Challenge
Can you develop a chatbot conversing with voice to teach basic mathematics/alphabets to kids?

Target Users
Primary education, day care, Toy makers

Few resources to refer for more details:

1. https://developer.amazon.com/alexa-skills-kit/kids
2. https://developer.amazon.com/post/Tx1DSINBM8LUNHY/New-Alexa-Skills-Kit-ASK-Feature-Audio-Streaming-in-Alexa-Skills
3. https://developer.amazon.com/public/solutions/alexa/alexa-voice-service/rest-overview

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Challenge 11/ Smart plug for energy supply driven by Android app

Background
Smart outlets either replace a conventional outlet or plugs right into a conventional outlet. These useful products can help prevent vampire power. They are comparatively inexpensive and can reduce your overall power consumption, which is better for your bank balance and the environment. Smart outlets are incredibly easy to use, particularly the plug and go models that simply slot into an existing traditional outlet. This ease of use and low price tag, combined with immediately visible results with the monitoring features, make these smart products a great introduction to smart home technology and a solid foundation to building a smart home.

Challenge
Can you build a smart plug connected to Android mobile for monitoring energy consumption?

Target Users
Hospitals, Households, Offices, Industrial Units, Academic campuses and others indoor places

Few resources to refer for more details:

1. https://www.sciencedirect.com/science/article/pii/S0301421517300393
2. http://www.ti.com/solution/other_building_automation_smart_plug
3. https://www.researchgate.net/publication/283231526_Design_of_Smart_Home_System_Based_on_WiFi_Smart_Plug

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Location: IIT Guwahati

Challenge 12/ Facial Image based BMI calculator

Background
Research in physiology has shown that facial expressions provide a lot of cues to human psychological and physical features. In today's world where selfie has become common among millennial, a lot of use-cases in recruitment and user tagging are being built. Life Insurance companies require BMI for underwriting life policies, as they are looking for automating underwriting process they want to have approximate BMI by image.

Challenge
Can you create an application which allow user to take selfie and report the BMI?

Target Users
Insurance, E-Commerce, Retail, Banking, Healthcare

Few resources to refer for more details:

1. https://arxiv.org/pdf/1703.03156.pdf
2. https://www.sciencedirect.com/science/article/pii/S0262885613000462
3. http://www.fasebj.org/doi/abs/10.1096/fasebj.31.1_supplement.955.11
4. http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0169336&type=printable

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Location: IIT Guwahati

Challenge 13/ Fake news detection using web crawled data

Background

Fake news is a piece of news/source that intentionally fabricate information, circulate deceptive information and content, or grossly distort actual news reports. Fake news is information that has no factual basis or information that is fabricated by those who do not have the appropriate credentials to be writing news stories. In recent days, social media has been hijacked by people/groups running propaganda for malignant motives. The information is being created to lure unaware netizens to believe and react to news and information which is not factual. The situation has become so alarming that now social media have taken cognizance of this and working to eradicate it completely. The fake news detection algorithm is being developed by incorporating algorithms using latest research done in the area of association rule mining, graph databases, and block chain based validation techniques. The core challenge for measuring the authenticity of any news items circulated in social media is that there is no gold standard for right information. In absence of any such standard, the data science algorithms have to rely on collective knowledge of
netizens/trusted sources. The algorithms are unable to provide a black and white answer but validating the information from various sources does provide an opportunity to filter information.

Challenge

Can you create an application to give credibility score to a news article, hence flagging news having unverified facts?

Target Users

social media, electronic media, law enforcement, news agencies

Few resources to refer for more details:

1. http://www.fakenewschallenge.org/
2. http://www.kdd.org/exploration_files/19-1-Article2.pdf
3. https://www.kdnuggets.com/2017/10/guide-fake-news-detection-social-media.html
4. https://web.stanford.edu/class/cs224n/reports/2710385.pdf
5. https://towardsdatascience.com/i-trained-fake-news-detection-ai-with-95-accuracy-and-almost-went-crazy-d10589aa57c

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Location: IIT Guwahati

Challenge 14/ Breaking news detection from crawling web data

Background
Internet has been used as one of the communication channels for spreading breaking news. There are method to collect, group, rank and track breaking news in Social Media. Current detection method is limited to facts part of messages. Users can discover breaking news from the Twitter timeline. Each story is provided with the information of message originator, story development and activity chart. This provides a convenient way for people to follow breaking news and stay informed with real-time updates.

Challenge
Can you develop an application using social media data to discover breaking news?

Target Users
social media, electronic media, law enforcement, news agencies

Few resources to refer for more details:

1. https://www.researchgate.net/publication/221156676_Breaking_News_Detection_and_Tracking_in_Twitter
2. https://github.com/fhamborg/news-please
3. https://www.botify.com/blog/breaking-news-botify-announces-javascript-crawl/
4. https://webhose.io/data-feeds/news-api/

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Location: IIT Guwahati

Challenge 15/ Assaying and grading of fruits for e-procurement

Background

Electronic National Agriculture Market (eNAM) is a virtual market with a physical market (mandi) at the back end, which networks the existing APMC/mandis to create a unified national market for agricultural commodities for pan-India electronic trading. The assaying of agricultural produce at the market level is of utmost importance to enhance the marketability of the produce and to enable the farmers to realize price commensurate to the quality of their agricultural produce.

Mandis handles huge volumes (lots) of arrival and smaller lots, hence it is essential to provide quick quality assaying solutions (preferably within a minute/ parameter) to promote online trading.

Challenge

Can you develop an application based on IoT (Computer Vision) for quick grading & assaying solution for fruits (e.g., Apple or orange) which can also be connected to the internet to increase the efficiency of the agricultural chain?

Target Users

Farmer, procurement mandis, storage houses, food companies

Few resources to refer for more details:

1. https://www.sciencedirect.com/science/article/pii/S2214317316300385
2. https://pdfs.semanticscholar.org/4aa0/a0cdfe036b512b9c6a0e9f34c7f47382a27d.pdf
3. http://pubs.ub.ro/dwnl.php?id=CSCC6201601V01S01A0008
4. http://tmu.ac.in/college-of-computing-sciences-and-it/wp-content/uploads/sites/17/2016/10/CCSIT114.pdf

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Location: IIT Guwahati

Challenge 16/ Create connected graph for students to discover connected insights

Background

We all aspire to be something in life, follow some role models and want to achieve something big. All these aspirations are connected to the individuals schooling, graduation, industry experience and so on. The ability to acquire a skill and prove it relevant to land in a dream job is always a challenge. Discovering talent and identifying the most suitable job are two sides of the same coin. Talent Map is built on powerful graph databases which could explore some hidden connections between a person and a company. Graph databases traverse the intricate connections between profiles and help in coming out with not only matching a person to a job but could be used in various use-cases for career development. Think of, if somebody could tell you "10 skills to acquire to land a dream job in Google" or "Best institutes to get trained as a fashion designer".

In a connected world, storing massive details around interconnections between various entities is computationally costly in the traditional Relational Database Management System (RDBMS) and offers very little intelligence for any analytics capability. This brings us to graph databases, which are from a NoSQL parlance, overcoming the challenges of RDBMS. The relation between two entities is found through an efficient graph traversal algorithm rather than database queries which are based on execution plans.

Challenge

Can you develop an application to collect data and populate connected graph using neo4j/titan to discover insights from connected data?

Target Users

Human Resource Management, Recruitment, Competency maps, Project allocation and skill development programs.

Few resources to refer for more details:

1. https://www.wired.com/insights/2014/11/graph-databases-recruiting/
2. http://blog.bruggen.com/2014/09/graphs-for-hr-analytics.html
3. https://graphaware.com/neo4j/2016/07/19/neo4j-key-human-capital-people-hcm.html

4. https://linkurio.us/blog/hr-analytics-graphs-match-person-job/

Sponsor: Probyto
Location: IIT Guwahati

Challenge 17/ Digital election based on Blockchain technology

Background
Since the dawn of democracy, elections throughout the world have been plagued with accusations of illegitimacy. As democratic societies across the globe are beginning to adopt technology to improve the efficiency of the election process, many people are discovering that certain types of technology can be extremely vulnerable, which may have the potential to unfairly influence the outcome of elections.

Using blockchain technology, we will be able to gain transparency into our elections, without compromising voter privacy, and have a way to mathematically prove that the elections results are accurate. Also, at the voter's request, there would even be a way to allow a voter to cast their vote online in an election and follow their vote into the ballot box to ensure that their vote was safely and securely stored without being changed or altered in any way.

Challenge
Can you develop an online voting application based in blockchain ?

Target Users
Electoral agencies, Governments, Corporate bodies, student bodies

Few resources to refer for more details:

1. https://followmyvote.com/
2. https://docs.polys.me/technology
3. http://bitcoin-class.org/presentations/Blockchain_Voting.pdf
4. https://hackernoon.com/blockchain-for-voting-and-elections-9888f3c8bf72
5. http://www.europarl.europa.eu/RegData/etudes/ATAG/2016/581918/EPRS_ATA%282016%29581918_EN.pdf

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Challenge 18/ Computer vision & Deep learning to deliver Telemedicine solution in Dermatology

Background

Now a day, skin diseases are mostly found in animals, humans and plants. A skin disease is a particular kind of illness caused by bacteria or an infection. These diseases like alopecia, ringworm, yeast infection, brown spot, allergies, eczema etc. have various dangerous effects on the skin and keep on spreading over time. It becomes important to identify these diseases at their initial stage to control it from spreading. These diseases are identified by using many technologies such as image processing, data mining, artificial neural network (ANN) etc. Recently, image processing has played a major role in this area of research and has widely used for the detection of skin diseases.

Techniques like filtering, segmentation, feature extraction, image pre-processing and edge detection etc. are part of image processing and are used to identify the part affected by disease, the form of affected area, its affected area color etc. This paper presents a survey of various skin disease diagnosis systems using image processing techniques in recent times.

Challenge

Can you develop an computer vision based technique to provide preliminary identification of skin disease?

Target Users

Hospitals, Primary Healthcare, Veterinary hospitals, botany and other healthcare related to dermatology

Few resources to refer for more details:

1. http://ieeexplore.ieee.org/document/8093746/
2. https://pdfs.semanticscholar.org/6984/d88a95ffe9afddd0718a56e1baa34e801c8b.pdf
3. https://pdfs.semanticscholar.org/70c7/ef3e12d648aa978c1badc5fc47fac740458d.pdf
4. https://arxiv.org/ftp/arxiv/papers/1609/1609.03277.pdf
5. https://www.researchgate.net/publication/283878737_Dermatological_disease_detection_using_image_processing_and_artificial_neural_network

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Location: IIT Guwahati

Challenge 19/ Smart Interview driven by AI to speed up recruitment

Background
Many times, as a recruiter, you'll find both active and passive candidates who fulfill a job description. Some problems arise when the candidate must go to the office to conduct an interview with the recruiter. The main issues are related to distance and transportation. Also, if we are dealing with a passive candidate who already has a job, conducting an interview is almost impossible. If you can reach them, you need to provide some facilities to proceed with the interview.

While above situation describes time flexibility for interview, this system can save lot of cost and help do initial screening beyond resumes.

Challenge
Can you develop an AI driven HR for a basic interview?

Target Users
Recruitment, Placement agencies, HR consultancy firms, employment platforms

Few resources to refer for more details:

1. https://dzone.com/articles/smart-interview-a-new-way-for-recruiting-candidate
2. https://nypost.com/2017/12/04/ai-already-reads-your-resume-now-its-going-to-interview-you-too/
3. https://glider.ai/
4. https://www.hirevue.com/

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Location: IIT Guwahati

Challenge 20/ Smart Cop to detect and fine traffic violations on road

Background

Dangerous lane changing, illegal overtaking, and driving in the wrong lane account for a high percentage of the total accidents that occur on the road, second only to accidents due to over-speeding. Automated traffic applications typically encompass the detection and segmentation of moving vehicles as a crucial process. Background subtraction and shadow detection are amongst the most challenging tasks involved in the segmentation of foreground blobs in dynamic environments. An effective balance between accuracy and speed is required to process a continuous feed of high resolution images from multiple cameras. Police Eyes is a mobile, real-time traffic surveillance system we have developed to enable automatic detection of traffic violations. Police Eyes would be useful to police for enforcing traffic laws and would also increase compliance with traffic laws even in the absence of police. The system detects illegal crossings of solid lines using image processing and efficient computer vision techniques on image sequences acquired from IP cameras. The automatic solid line crossing detection system can be used at locations where the traffic violations are notoriously high and are known to create traffic congestion and avoidable accidents. The system can be installed on an embankment, at an intersection area, at a lane change restriction area, at a no parking area or anywhere there is an observed pattern of drivers intentionally violating traffic laws. We have installed the system in an industrial grade embedded PC and deployed it in a police mannequin. Results of an empirical field evaluation show that the system performs well in a variety of real-world traffic scenes.

Challenge

Can you develop an application using in video/cctv feed to detect traffic violation and send an fine to vehicle owner?

Target Users
Traffic police, law and order enforcements, revenue departments

Few resources to refer for more details:

1. https://www.sciencedirect.com/science/article/pii/000368709190159F
2. http://ieeexplore.ieee.org/document/6559635/
3. https://patents.google.com/patent/US20120148092A1/en
4. http://www.iject.org/vol73/27-harwinder-singh.pdf
5. https://www.hirevue.com/

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