



Department of Information Technology

List of Projects Completed By M.Tech Students

Session: 2020-2021

A SMART HEALTH CARE SYSTEM USING IOT AND MACHINE LEARNING

Guided By: Dr. Suparna Biswas

Abstract: Elder people suffer from many kinds of diseases like heart disease, High pressure, High sugar. The medical facilities of Indian villages are very poor. Villagers face a great problem when any of them is ill. A smart health care system is designed to monitor people from their home and take their timely health status. It helps to reduce pressure over doctors and hospitals and saves the life of many old people. Some sensors like heart beat sensor, blood pressure sensor, Blood sugar sensor, temperature sensor are attached to the human body. The sensors are connected to a health care app. The app has two sections for both users and doctors. At first the patients have to register in this app. Patients' regular health records are sensed by the sensors and stored in the database of this app. The system analyses the data. If any data is found wrong then it is automatically sent to the nearest hospital through GPS tracker and they will take immediate action.

Member:

Tapaprabha Chowdhury (Roll No: 30011418001)

ASSESSMENT & PREDICTION OF AIR POLLUTION FROM SATELLITE IMAGE

Guided By: Dr. Somdatta Chakravortty

Abstract: The Copernicus Sentinel-5 Precursor mission is the first Copernicus mission dedicated to monitoring our atmosphere. Copernicus Sentinel-5P is the result of close collaboration between ESA, the European Commission, the Netherlands Space Office, industry, data users and scientists. The mission consists of one satellite carrying the TROPospheric Monitoring Instrument (TROPOMI) instrument. The TROPOMI instrument was co-funded by ESA and The Netherlands. The main objective of the Copernicus Sentinel-5P mission is to perform atmospheric measurements with high spatio-temporal resolution, to be used for air quality, ozone & UV radiation, and climate monitoring & forecasting. The satellite was successfully launched on 13 October 2017 from the Plesetsk cosmodrome in Russia. Tropomi (TROPospheric Monitoring Instrument) is a spectrometer sensing ultraviolet (UV), visible (VIS), near (NIR) and short-wavelength infrared (SWIR) to monitor ozone, methane, formaldehyde, aerosol, carbon monoxide, NO₂ and SO₂ in the atmosphere. It extends the capabilities of the OMI from the Aura satellite and the SCIAMACHY instrument from Envisat. Tropomi will be taking measurements every second covering an area of approximately 2600 km wide and 7 km long in a resolution of 7 x 7 km. First of all, I collected the sentinel-5p satellite image everyday from the Copernicus site and extracted the real-time data from the image to form a dataset of each parameter. In the 1st chapter, I predicted the data of MAKAUT, Haringhata and compared the rmse and accuracy using different models. In the second chapter, during the lockdown period, I compared the data of four metropolitan cities – Kolkata, Mumbai, Chennai and Delhi by plotting them in graphs. Secondly, I compared the rmse of predicted training and testing dataset from actual



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dataset of Kolkata before, during and after lockdown using 3 models – Decision tree, Random Forest, Recurrent Neural Network LSTM(Long Short -Term Memory). In the third chapter, I implemented the Markov Chain model to predict the future API(Air Pollutant Index). I divided the dataset from February to June 2020 into 3 sets – Pre-lockdown, during lockdown, post-lockdown. Then calculate the probability of occurrence of different states in future and the mean return time of after how many days the state will repeat by itself. Lastly, I calculated the rmse and accuracy and after comparing with previous models, I have observed that the markov model gave best result with minimal error and more accuracy.

Member:

Priyanka Biswas (Roll No: 30011418004)

PICPASS: GRAPHICAL PASSWORD AGAINST SHOULDER SURFING ATTACK

Guided By: Dr. Debasis Giri

Abstract: The objective of this paper is to introduce a new secure, user friendly and economical multi-level graphical authentication scheme that works based on multiple factors for gaining access to valuable resources on a secure system. The proposed study is based on a postulate that when multiple levels and multiple factors are incorporated in an authentication scheme it not only becomes difficult to break but also resistant to different types of vulnerability to security threats such as shoulder surfing attacks. This work proposes a scheme where authentication is carried out into three levels along with Out of Band (OOB) authentication that offers reliable security against man-in-the-middle (MIM) attack. The first level uses a unique username. Second level uses one time password (OTP) verification based on Out of Band (OOB) authentication using email id and mobile number. Third level associates user's interaction on a graphical screen in terms of predetermined number of clicks on images. The security of the proposed system depends upon a unique User ID, out of band authentication using OTP and user interaction on a graphical screen that uses a sequential combination of various images as graphical password which is encrypted by PBKDF2 (Password Based Key Derivation Function) encryption.

Member:

Partha Karmakar (Roll No: 30011418005)

PREDICTION OF ALGAL BLOOMS IN MACHINE LEARNING

Guided By: Dr. Somdatta Chakravortty

Abstract: Water body extraction is an important part of water resource management and has been the topic of a number of research works related to remote sensing for over two decades. Extracting water bodies from satellite images with a pixel-based method or indexes cannot eliminate other objects that have a low index, such as shadows and built-up areas. Since their spectral differences cannot be separated, in this method a pixel based index has been used on a Sentinel-2 satellite image with a resolution of 60 m. The method uses image segmentation on a multispectral image containing 13 bands. It also uses indexes used for extracting water bodies, such as the Normalised Difference Water Index (NDWI). The objective of this study is to analyse the spectral properties of water pixels in the multispectral image for water quality monitoring. Parameters such as presence of chlorophyll-a, Total Suspended Solids(TSS), Colour Dissolved



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Organic Matter(CDOM), Total Nitrogen(TN) and Total Phosphorus(TP) of water were measured. The results based on spectral features of water reflectance showed good correlations with water quality parameters. The output values using spectral bands at Red/Near Infrared showed a high correlation with chlorophyll-a concentration. The ratio of aerosol to blue spectral bands is the best predictor of CDOM and is best correlated with spectral features at red and NIR regions. The ratio of green to blue spectral bands is the best predictor of Total Nitrogen concentration. The ratio of red to green spectral bands is the best predictor of Total Phosphorus concentration.

Member:

Lipika Dinda (Roll No: 30011418007)

A REVIEW ON VISUAL PERCEPTION USING MACHINE LEARNING ALGORITHMS

Guided By: Dr. Sriparna Saha

Abstract: Perception, a novel research topic and its application in recent age attracted by many researchers and students to ensure their sensory based project. Thus it became a challenging topic to brighten up through their experiment. Moreover perception gave us an area to research due to its several sensory effects and effort. It can be achieved by parsing or interpreting sensory information by our several sensory organs via some neuron stimuli. Our sensory organs like the eye, ear, nose, tongue and skin give a vibration when it perceives some object and generates one action stimuli. Not only today's study encompasses this organ or organ sensory effect but also introduced a new technology where a humanoid robot tries to acquire this technique and provide a large scope of new research area. Several sensors are engaged to get accurate output in this kind of project. This thesis introduces perception with its features and several types of perception and also their related study and knowledge of previous experiments. Communication with our physical world as being a living creature we need to accept several circumstances. This situation gives us feelings of happiness, sadness, danger, a soothing feel etc. Those all are physical sensations which happen not only in human beings but also animals can feel the same. For this sensation we are able to sense the taste of food, smell of flowers, we can see the whole world with our vision, listen to music and some sensation gives us an active sensation called touch. Within our body there are 5 main sensory organs working together similarly some physical impairment occurs in our body, then one sensory organ falls to sense the other sensory organ might disturb during their work path. To recognize objects is one biggest challenge for the people who are physically or mentally imbalanced. Impairment people, those who are not only blind people but also the persons who are in unstable condition not able to identify objects. Therefore machine learning helps us to get out of this situation. Here we distributed this thesis in several parts based upon perception. Chapter 1 describes the background concept regarding perception and chapter contains several perceptions. Chapter 2 divided into several parts. Chapter 2 contains different types of perception and there also another part in chapter 2.6 electroencephalogram (EEG) and chapter 3 contain our related approach and in chapter 4 contain conclusion.

Member:

Arijita Ghosh (Roll No: 30011418009)



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A P2P BASED FOG COMPUTING ARCHITECTURE FOR EFFECTIVE RESOURCE MANAGEMENT USING ADEQUATE LOAD BALANCING ALGORITHM

Guided By: Dr. Sujoy Mistry

Abstract: In the paper the main cynosure was partial offloading which has been successfully implemented, the other aspects which have not been touched upon yet are Resource Allocation, Task Scheduling and Load Balancing. In a fog computing environment application of proper resource allocation and load balancing is much necessary so that the tasks get well executed without much delay. In our work, we have introduced an efficient resource allocation algorithm which efficiently allocates resources and a load balancing algorithm which will balance the load in a network so that the devices do not get overloaded and there is fast execution of tasks. In our work, our objective is to consider the following issues and work on them :-

1. Proper allocation and utilisation of network resources.
2. Heighten the performance of the entire network.
3. Minimise the communication delay in fog network
4. Increases service availability in the fog computing environment
5. Deal with unexpected discrepancy of the system.
6. Balance the load efficiently among the nodes all over the network.
7. Deliver fault tolerance if the system crashes, to sustain the reliability of the system.
8. Offer good quality services to the end users.

Member:

Archita Basu (Roll No: 30011418010)

SMART HEALTHCARE SYSTEM

Guided By: Dr. Deepsubhra Guha Roy

Abstract: In this daily life, being healthy and being busy with hard work is nearly impossible, and has turned into a matter of worry for the huge majority of the general population. Long waiting periods at the hospitals or monitoring patients becoming a serious issue. The issues request for a health observing framework which can screen the day by day routine parameters, check heart rate consistently and can report the same to the concerned individual with the assistance. Our framework advances the technique which utilises the sensors to track patients' health and using the web, inform their friends and family if there is any occurrence of any issues. Our framework utilises temperature and in addition heartbeat detecting to monitor patients' health. The sensors are associated with an Arduino microcontroller and IOT module to track and maintain health, also wireless connections keeping that in mind the end goal to transmit alarm. On the off chance that framework distinguishes any sudden changes in heart beat or body temperature, the framework consequently alerts the client about the status over IOT and furthermore indicates points of interest of heartbeat and body temperature, live using the internet. Subsequently this IOT based framework adequately utilises the web to screen the statistics of health and save lives on time.

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