

Guest Editorial Preface

Special Issue on Machine Learning and Its Applications: Biomedical and Emerging Fields

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One of the most exciting technologies today is Machine learning which as evident from the name, gives the computers: the ability to learn on its own. Learning ability comes by feeding examples through data in machines or computers like human beings learn and start taking decisions through experience which are basically different examples which machines are learning from data which is fed into the machine.

Various Applications of Machine Learning are:

- **Web Search Engine:** The main concept behind how the search engines like google, bing etc. Search so fast and can give you plethora of information in seconds is through a machine learning algorithm built inside the engine.
- **Photo Tagging Applications:** Similarly, the photo tagging mechanism in the various social media websites is the most exciting feature of the social media websites for youngsters. This feature is also the gift of machine learning algorithms particularly called as face recognition algorithm.
- **Spam Detector:** Spam detector is also one of the very exciting features of machine learning algorithms of mail agent like Gmail or Hotmail which involves classifying emails and moving mails to spam folder. This again is the application of machine learning algorithms.
- **Healthcare:** Healthcare is also an very upcoming and important industry in which machine learning offers tremendous applications to millions of people and at the same time its applications provide top revenue earning to many countries. Machine Learning enabled smart healthcare is now no longer a flight of fancy and wearable sensors controlled with machine learning algorithms is talk of the day. Machine Learning in healthcare analyzes thousands of different data points and suggesting outcomes, provide timely risk scores, precise resource allocation, and has many other applications. Existing Applications of Machine Learning in Biomedical Field are:

- a) **Identifying Diseases and Diagnosis:** One of the major ML applications in healthcare is identification and diagnosis of diseases and ailments which are otherwise hard-to-diagnose. This can include anything from mental diseases which are tough to catch during the initial stages, to other genetic diseases.
- b) **Drug Discovery and Manufacturing:** One of the other clinical applications of machine learning lies in early stage is drug discovery process. This includes R&D technologies such as next-generation sequencing and precision medicine which can help in finding alternative paths for therapy of multifactorial diseases.
- c) **Medical Imaging Diagnosis:** Computer Vision is the most upcoming technology of Machine learning and deep learning are both responsible for the breakthrough in the field of medical science and is accepted by Microsoft venture InnerEye which is image diagnostic tools for image analysis.
- d) **Personalized Medicine:** Personalized treatments are one other gift of machine learning algorithms which by pairing individual health with predictive analytics can help in further research and better assessment of disease.

So now we can understand the importance of machine learning and the way it has changed the life around us and made it more exciting. This awareness makes the readers to go through the following Special Issue to explore what machine learning can do and help us in various facets of life. The following Special Issue focus on “Machine Learning and its Applications - Biomedical and Emerging Fields”.

This special issue of the International Journal of Organizational and Collective Intelligence (IJOICI) contains five research papers which gives novel and innovative applications of machine learning in biomedical and other upcoming fields. The first research paper of the issue focusses on “Artificially Intelligent Controller-Based Speed Control of Switched Reluctance Motor,” which emphasizes on novel control methodology for controlling the speed of switched reluctance motor (SRM) drive using Intelligent Controller. The control technology consists of an outer loop Fuzzy controller as speed controller and Hysteresis current controller as the inner control loop along with control of switching angles for the four phase, 8/6 SRM. In this proposed method the speed control is optimized using the randomly determined fuzzy parameters. Fuzzy interfaced speed control of SRM is simulated using MATLAB/SIMULINK software. Robust performance of fuzzy logic controller is valued using least combinations (matrix) of rules for wide ranges of speed and is compared with Proportional-Integral (PI) controller.

The second research article emphasizes on “Prediction and Estimation of Lung Cancer and Authenticating by CNN-ECC Model,” which is the application of machine learning in Biomedical Field. The primary detection of the presence of viral infections in lungs are one of the major concerns in the health industry in today’s scenario. These infections can lead to mortality. It involves data analysis on the genesis of disease and the outcome of mortality is very crucial to keep track of the death rates induced due to the disease. Therefore, the classification and analysis of disease are very pivotal along with security of data. Hence it is essential for detecting diseases using CNN algorithm at an early stage and generation of medical report automatically. The method is tested for different models with various lung infections like pneumonia, Covid-19 and cancerous growth in lungs. For these system generated reports encryption using ECC algorithm is used to prevent the breach of information while being exchanged from hospital to other organizations or vice versa.

The third research article, “Deep Learning-Based Diabetic Retinopathy Detection,” throws light on Artificial Intelligence (AI) which is rapidly evolving from Machine Learning (ML) to Deep Learning (DL) and has ignited particular interest in ophthalmology as well. Deep learning has been applied in ophthalmology to fundus photographs which achieve robust classification performance in the detection of Diabetic Retinopathy (DR). Diabetic Retinopathy is a progressive condition observed in people who have had multiple years of diabetes mellitus. This paper focuses on examining how a deep learning algorithm can be applied for the detection and classification of diabetic retinopathy, both at the image level and at the lesion level. The performance of various neural networks is summarized

by taking into account the sensitivity, precision, accuracy with respect to the size of the test datasets. Various Deep Learning problems are also discussed.

The fourth research article in the issue is “Developing a Graphical User Interface for an Artificial Intelligence-Based Voice Assistant,” which is the another very interesting application of machine learning which emphasizes on Artificial Intelligence machines that are being extensively active in human life in recent times. One such tool is Voice Assistant which can be incorporated into many other brilliant devices. In this article, the voice assistant will receive the audio from the microphone and then converts that into text, later with the help of ‘pyttsx3’ and then the text response will be converted into an audio file, then the audio file will be played. The audio is processed using the Voice User Interface (VUI). In this article, developing a functional Intelligent Personal Assistant (IPA) and integrating it with a Graphical User Interface, that can perform mental tasks such as ON/OFF of smart applications based on the user commands.

The last research article, “Machine Learning Approach for Brain Tumor Detection and Segmentation,” of the issue focuses on Brain tumor which is one kind of decease which affects the brain directly. Detection of the brain tumor and related abnormalities is possible, but manual segmentation is usually tedious, time-consuming, and subject to error. But nowadays it becomes very easy to detect and segment it is using medical images. MRI is the finest imaging techniques for a brain tumor and feature information of tumor size, its location, and type. This paper deals for detection, localization and segmentation of tumor through Watershed algorithm in MR images. The K-means clustering machine learning technique is used to evaluate the system performance.

As the official journal of IGI Global, IJOI is proud to bring you this special issue. We hope that reading these high-quality papers will inspire you to make your own submissions to future IGI Global Journals, and to support the new era of Machine learning equipped devices and will acquaint you to the plethora of machine learning applications.

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