

Approaches Of Deep Learning In Persuading The Contemporary Society For The Adoption Of New Trend Of AI Systems: A Review

Sanusi Darma Abu, Fatma Susilawati Mohamad

Abstract: Deep learning models are progressing rapidly into a diverse lifestyle, which includes finance modeling, education, manufacturing, marketing and policing, as well as in creating innovative technologies such as autonomous systems. They are used in medical field to improve the accuracy of health conditions or to detect diseases in body. Artificial intelligence technologies are used in Social Media applications such as Netflix, Facebook, Google; Sportily, etc. The algorithm used in these programs could monitor user-browsing habits and makes recommendation best on their recent web browsing activities. Modern banking system uses deep learning approaches to monitor the activities on customers' accounts, to check for any possibility of theft, to approve loans, and to maintain an online security system. However, deep learning approaches are offering a variety of benefits not only to online learners but also to organizations that invest in modern eLearning platforms. This paper explored the impacts of deep learning approaches in shaping the use of AI systems in numerous walk of life. This system of machine learning is robust in building a more organized contemporary society.

Index Terms: Artificial Intelligence; Machine Learning; Deep Learning; Modern Society

1. INTRODUCTION

THE advent of information and communication technology (ICT) in our contemporary society has brought an era conquered by computing technology where artificial intelligence is playing a greater role, particularly in the field of intelligent systems. Artificial Intelligence is the development of software and hardware systems that is capable of doing diverse tasks using human like intelligence. In other words, it is the process of imitating human intelligent behavior by machines [1]. AI has gave birth to machine learning, the improvement of machine learning methods led to the new advancement and transformation of machine learning to deep learning approaches [2]. Machine Learning tried to model the world, but deep learning attempt to models the human brain to create and maintain its own representation of the world [3]. Currently, deep learning has becomes the fastest growing AI method used for developing applied software for natural language, computer vision, robotic control, speech recognition and many AI applications. It is evident that many AI developers have now realized that developing a system is far easier when you make it to learn by training it with samples dataset than to program it manually expecting the favorite result on each possible input. The impact of deep learning has touched all aspect of computer science and pass through a range of businesses concerned with big data analytic issues, such as the diagnosis of faults in complex system, consumer services and control logistics chains. Its effects have also touches a wider range of empirical sciences, from social sciences to biology to cosmology. Being it an AI approach, it has been designed to analyze large amount of experimental data in a unique way [4].

Likewise, Deep Learning approaches have been applied to different research problems relating to Health Care System, Music Processing or Bioinformatics. Some of these deep learning applications are said to surpass human level performance [5]. Deep learning using artificial intelligence continue to become more and more popular and having impact in many areas of studies, it offer online learners of the future with intuitive algorithms and automated delivering of eLearning through modern learning management system (LMS) platform [37]. New interactive designed paradigms will be required for the application of the future internet of things [6]. In line with this, deep learning systems will continued to become helpful in personal health care tracking, smart home and smart environments management, wearable technology, robotics, massive open online courses, personal finance management, intelligent transport system as well as interdisciplinary sciences all of these have a unique requirement and greatly improve education [7]. The technology in Deep Learning has outperformed other handcrafted machine learning techniques as well as single layer Artificial Neural Networks. This technique of AI includes four common learning algorithms that allow the system to predict future outcomes and detected patterns based on specific user data. Supervise learning algorithm utilized past examples and new data set to predict the intended outcomes. Initially, the system start with providing inputs and output to train the software. Then the system can automatically construct outputs or target. Unsupervised learning algorithm do not involve any label or data classifications. The system evaluate data to identify patterns and make predictions. Simi-Supervised learning algorithm contain unlabeled and labeled data to map out certain inputs and output with grate accuracy. The reinforcement-learning algorithm includes specific task or goal that the system should complete throughout the process; it receives feedback to learn the desired behaviors [38].

- Sanusi Abu Darma is currently pursuing his PhD program in Artificial Intelligence (AI) in University Sultan Zainal Abidin, Faculty of Informatics and Computing, Campus Besut, Terengganu, Malaysia, Si3182@putra.unisza.edu.my, darmasanusiabu@yahoo.com
- Dr.Fatma Susilawati Mohamad is currently a Senior Lecturer in the University Sultan Zainal Abidin, Faculty of Informatics and Computing, Campus Besut, Terengganu, Malaysia. fatma@unisza.edu.my farie99@gmail.com



Figure 1: Application of Deep Learning technology in automated machine and robotics control, natural language and speech processing, neuroscience research and computer vision for image processing [38].

1.2 Background

In the early days of computer science, algorithm was a common word in computing industries especially among the computer scientists who used to deal with computing technology in their daily computing activities [1]. Algorithms are everywhere, embedded not only in traditional computational devices such as Laptop, Desktop, PDA and smartphones, but also in our houses, our working places, and our lives styles. We enter working places with our badge that contains a Radio Frequency Identification (RFID) tag, which used to access the building by reading the tag with the RFID reader positioned at the entry door. As soon as we enter our vehicle, our smartphone couples with the car's firmware through Bluetooth immediately starts to play Spotify's playlist. Not limited to the car firmware, also enables us to perform phone calls through voice commands [2]. All these are examples of algorithms present in our daily routines, their existence almost not perceived by us as the technology becomes universal and globally available. Algorithms are, in a simple manner, a set of instructions that tells the system to execute a given task to achieve the desired goal. They are the basis of computer science since the beginning of computer usage, programmers always had to explicitly say what the algorithms should do, writing its instructions manually and maybe in a bulky way [2]. With that, researchers started to wonder if we could make our computer learn from data in the same manner as we do. That is algorithms to look at available data and learn to execute a task with a goal without being explicitly told to do so. What if an algorithm could read medical records, understand what causes certain diseases and automatically tell us the correct treatment? This led to the invention of machine learning. Machine Learning is the current trends of AI technology, which is expanding rapidly, and it is influencing nearly every technological aspect of the society. The main reason of this computing technology is to make a machine to mimic human senses i.e. the machine is able to master what it has been trained for and to automatically perform a task from

what it has mastered without being program [3]. Machine Learning is about designing algorithms that allow a computer to learn. Learning does not necessarily involve consciousness but learning is a matter of finding statistical regularities or other patterns in the data [4]. The computational problems that are historically considered part of machine learning include reasoning, knowledge, and discovery, planning, learning natural language processing, perception and the ability to move and manipulating objects [5]. According to [6] machines have reached the same level and even exceeded human's abilities in many different tasks, such as object detection, music recommendation, and image classification. Majority of these results have been possible due to a new trend of machine learning called Deep Learning [7].

Deep learning refer to the neural network with a single input layer, two or more hidden layers and one output layer. The history of this technology was dated back to 1960s, when G. Alexey and Lapa V.G published their work [11]. The development on this technology improves at slow steps. This is due to undeveloped training algorithms and the complexity of architectural design of the deep model. A historical development that happen in 1970 was the development of stochastic gradient decent algorithm, which was developed for training the artificial neural network. In 1990s, LeCun proposed a deep neural network model that consist of convolutional layer and pooling layer for the recognition of number digits, the model is called LeNet. The earliest deep learning model that promote deep neural network to its present level of world acceptance was the LeNet. The use of pre-train deep neural network with unsupervised learning algorithm begin in 2006, with the mission of parameter initialization [12]. With pre-train model, the new training algorithm has double phases. In the first phase, each of the two successive hidden layer are regarded as Restricted Boltzmann Machine (RBM) and the network weigh are optimized with an unsupervised learning algorithm. In the second phase, the model is fine turn after pre-training with an additional supervised algorithm. The pre-training model creates to have greater parameter values when equated with random initialization. This enable the training algorithm to reach the right local minimum error, which provide qualitative deep learning model with stabilized weight optimization. In 2012 eight layers AlexNet was developed by Krizhevsky et al. in the same year AlexNet has won the ILSVRL price with almost 85% classification rate together with 66% location accuracy. Other competitors lost the price to AlexNet, because they used linear classification. In the following year all the competitors uses deep neural network none of them has used tradition classifier. At the training stage the deep neural network, learn high level features. With its huge capabilities, deep learning has recoded success in image classification. This make deep learning technology attractive to many areas of research. A part from classification task deep learning also perform object detection, Natural Language Processing, speech recognition, sentiment analysis and numerous works of computer vision[8]. There are two phases of processing with deep learning, training phase and recognition phase. In the training phase, the train process uses feed forward and backward propagation technique for the training of the deep neural net with huge amount of training dataset. In the other hand, the recognition phase requires to pass through feed forward propagation process with input data. When the output is produce, some support processes are need to obtain the right information [9]. There have been millions of years of biological evolution. Almost three billion years was needed for the

evolution to create the current human being [10]. Evolution has increased human brain size exponentially over the last 8 million years. The brain is the source of our intelligence and it separate us from all other species [11]. The industrial revolution of 2nd -3rd centuries ago, produce machines that replace human labor. The computational machines started 70 years ago with the semiconductors and their exponential grow which lead to the creation of Artificial intelligence (AI), which replace humans in cogitative task [12]. The most important point is the time scale, both the human and machine evolution are exponential and while human evolution is in millions of years, the machine evolution is in decades. There is distinctive difference between human intelligence and current AI, but this may not be the case in the future (ibid)[11]. Deep learning is the flagship of the Artificial intelligence research and had recorded successful achievement in the last decades. Increased computational power and vast amount of digital data are foundation of DL, which is the heart of a multiple layer neural network. Deep learning achieved many break through, starting from vastly improving image recognition, natural language processing, etc [13]. Deep learning involves algorithms that predict possible outcomes based on user data, which allow a computer to display behaviors learned from experience rather than human interaction [14]. Deep learning and reinforcement learning (RL) won the game of Go, Atari, Poker and lastly Dota. DL and RL are currently expanding [15].

1.3. The key contributions of this review paper are as follows:

- This paper provides an understanding of how deep learning technology is mounting more advance applications in various fields of study that helps in creating efficient automated contemporary society.
- In addition, we explored the potential of deep learning models in complementing various human jobs.
- The paper has reviewed prior work done using deep learning approaches that indicates the effectiveness of deep learning approaches over traditional handcrafted machine learning approaches for enhancing the quality of life in modern society.

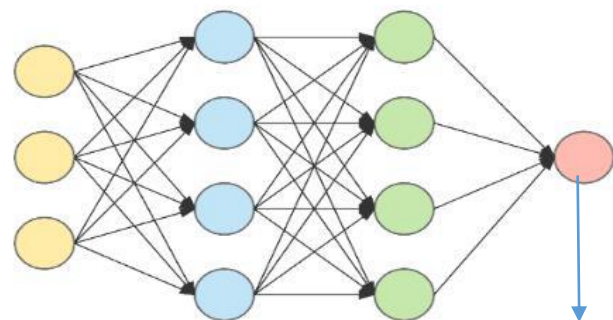
1.4 Organization of the Paper:

The rest of the paper is organized as follows. In Section II, We present an overview of deep learning and its various models. Section III we discussed the varroosis application areas of deep learning in our contemporary society, Section IV various existing literatures were discussed. Finally, section V consists of conclusion.

2. Overview of Deep Learning Technology

Deep Learning is a form of machine learning technology that equips the machine to learn, train, understand and experience the real world in terms of a hierarchy of concepts, which further permits the machine or the computer to assimilate complicated concepts by building them out of simpler ones [16]. DL process data from the lower level to high level and gradually composing increasing semantic concept simulate the hierarchical structure of the human brain [8]. There is definitely no need for the human help to operate the computer manually in order to particularize all of the knowledge needed by the computer because the computer itself converge the mastery from experience [17]. Deep learning in the field of machine learning successfully out performed other approaches by achieving numerous

performance in various fields [12]. Recently deep learning is growing as the most popular tool for big data analysis [18]. By using deep learning algorithms, Artificial intelligence has a big breakthrough in many areas, such as face recognition, image processing and speech recognition [19]. Deep learning is originated through understanding on how the neurons of human brain are processing information. The neurons are organized as a deep network architecture with a number of different layers that used to process the information within different levels of non-linear transformation & representation [20]. Deep learning studies the steps, organization, and pattern of the features from the down level features through multilevel of hidden layers of non- linear weight changes [21]. Very difficult tasks can be learned with enough of such weight changes. Representation of higher layers increase some part of the inputs that are significant for discrimination and suppress irrelative variation for any system recognition [12]. Deep learning combines advances in computing power and neural networks with many layers to learn complicated patterns in large amount of data. It is an extension of a classical neural network and uses more hidden layers, so that algorithm can handle complex data with various structures [22]. According to [23] deep learning is a form of representation learning in which a machine is fed with raw data and develops its own representations needed for pattern recognition that is composed of multiple layers of representations. These layers are typically arranged sequentially and composed of a large number of primitive, nonlinear operations, such that the representation of one layer (beginning with the raw data input) is fed into the next layer and transformed into a more abstract representation. As data flows through the layers of the system, the input space becomes iteratively warp until data points become distinguishable [24]. The deep neural network learn by cultivating the values pass to the output then relate them with already known data values. Users usually modify the formula based on the required output. Normally, the values are computed by using the derivative of the cost function and the use of gradient descent to adjust it. This algorithm will then lean to optimize the weights and values of the threshold, for it to give out the required output. This is how deep neural networks learn. In the other hand Machine learning, learn differently. Machine learning is more straightforward hands-on technique of using features to learn patterns and give suggestions. Machine learning is a technique of using data to make machine to learn with the absent of proگرامing [14].



Input layer hidden layer 1 hidden layer2 output layer

Figure 2: Deep Learning Network Architecture with two hidden layers [2]

2.1 Why Deep Learning Technology?

Deep Learning has touches all angles of computer science,

statistics and numerous areas of study that are apprehensive to regular upgrading over a period of time. Its improves decision making under unpredictable conditions [25]. The general purpose of Deep Learning technology is to provide powerful solution to sequences, association, classification cluster and prediction [26]. For the past decades, computing industries has been witnessing tremendous development on massive utilization of internet of things and smart computing technologies that are capable of sending and receiving huge amount of structure, unstructured and semi-structures data, a phenomenon that led to what is called Big-Data. Expertise and many stockholders who are at the crossroad of collecting and utilizing such huge dataset decided to move from traditional system of computer data processing to new computing technology of Artificial Intelligence (AI) for analytic solutions to the problems associated to the Big Data [27]. The transformation of AI technology to modern day deep learning technology has led to the proper handling of Big Data to drives suitable insight and important predictable solution for decision making from such kind of huge dataset. However, the large volume of these datasets make it necessary to invent robust techniques that will intermingle with the huge data computation. The issue is not only the data size, but also the persistent of mass-production of such datasets. The smart mobile computing devices and build in (Embedded) technology helps tremendously in collection such amount of data that concerned an individual person, and Deep Learning Algorithms are capable of learning from such large data and then improve their services to meet the prerequisite and conditions of each individual person. Many instances of such new AI regard to data collection, and mining of huge amount of data to enhance services and efficiency could be found within various field of science, government and commerce [28]. With the increasing of prominence of large-scale data in all areas of human endeavor led to the newest demands on the underlying Deep Learning algorithms. For example, huge datasets required computationally tractable algorithms that minimize privacy effects, and the availability of huge quantities of unlabeled data raises the challenges of designing strong Deep Learning Algorithms to take advantage of it [29].

2.2 The Major Deep Learning Models

Numerous deep learning models transform the way AI systems are used in our contemporary society. These includes the following:

2.2.1 Convolutional Neural Network (CNN)

The CNN was first proposed and applied for the high dimensional image analysis by [18]. It consist of convolutional filters, which transform 2D into 3D [30]. This deep learning model calculate the feature of an input image that correspond to the weight filter (kernel). The features that matched to the kernel can be calculate, since there are numerous weight filters, which are close to the size of the features that can be reduce by the pooling feature map. Because of this, it is likely to captivate the geometrical differences such as rotation and slight translation of the feed in image. The convolutional procedure and the pooling procedure are to extract the feature map frequently. The extracted features are inputted into fully connected layer and the likelihood of each class is to end output. Because of this, the first and the last layers, which are the input and the output layers have a network architecture that have components for the image and the number of classes [31]

2.2.2. Recurrent Neural Network (RNN)

RNN is a neural network architecture with recurrent connection between hidden states and has the capability of learning sequences and model time dependencies. The recurrent neural network connection are used to detect relationship not only between inputs but also overtime. Therefore it is well suited to health problems that often involve modeling clinical data changes overtime [22].

2.2.3. Deep Belief Neural Network (DBN)

This model has a unidirectional connection at two layers on the top of layers. The hidden layers of each subnetwork serves as visible layer for the next layer [11]. Deep Belief Networks (DBNs) in recent times proved to be very effective for variability of deep learning problems [16].

2.2.4 Deep Neural Network (DNN)

Deep Learning technology based on artificial neural network are called deep neural network (DNNS) the system comprise of bulky amount of successively connected layers of corresponding connected neurons. The grouping of access to huge quantity of data and powerful computers together with a sequence of invention (such as data normalizations and initialization strategies) led to the positive training of these gigantic size networks. One of the reasons that led to DNN high performance is it ability for representation learning. This model has more than two layers, which allows the complex non-linear relationship [32].

2.2.5 Stacked Auto-encoder Neural Network (SAE)

Accord to [33] Stack Auto-Encoder Neural Network is a variant of neural networks (NNs) applied efficiently for hierarchical feature extraction from its input and it is an unsupervised learning network. The Network included two parts, encoder and decoder parts.

3. Applications of Deep Learning in Our Contemporary Society

Currently, deep learning is in a phase of renaissance that is transferring practices in multiple field. Beyond the application of previously existing techniques. It helps in advancing the use of computer applications and intelligence systems in modern society, novel development in deep learning have transformed the landscape of available methodologies. Many of these developments are spear headed by industries, which are leading the application to everyday products and services; this make the society more automated [24]. An automated society means our culture will become more efficient and pleasant with the assistance of technology. While this is not the only benefit, it will also help low cost of items for public. A culture where automated vehicle takes people as means of transportation system, a culture where machine help to monitor automated machines making products, all these are very possible in the future [29]. DL technology enable the development of new applications in a wide variety of domains such as eLearning, eHealth, Autonomous systems/ smart cars, Smart environment, Research, Intelligent transport system, law enforcement and military applications, improving website development/usage, making phones application more personalized [8,32]. Smart system frequently make use of camera sensors to capture images and videos of the user interacting with system. Several kind of sensors are currently used to give users a natural feeling for controlling computer applications, smart TVs and game

consoles [34].

3.1 E-Learning:

Electronic learning (eLearning) is a type of delivery method used in distance education. That allows the synchronous and asynchronous exchange of resources over a communication network [12]. According to [24] deep learning, can aid eLearning development by improving the classification of elements of contents, as digital learners increasingly expect contents to be offer in multiple formats and on variety of platform. E-Learning system is a deep learning system that promotes communication and collaboration among students and instructors [11]. Electronic learning (eLearning) was lunched as a way of responding to the new set of educational demand; it has being define as a learning management system (LMS). A Software system that synthesize the functions of computer mediated communication software and online method of delivering course material [33]. In the eLearning domain, the deep learning process take place autonomously by extracting and evaluating the dataset from LMS to predicting what online learners needs based on their past content checking and performances [34]. One of the most important reason given for the large scale of investment in web based technology is their potential to enhance teaching and learning process [22]. To encourage the development of student centered independent learning and to deeper approach to learning [25]. Many higher institution of learning have been using course management system software (e.g. Blackboard, LMS, WebCT, and Moodle) to provide eLearning that complement traditional classrooms based instructor [28].

3.2 Deep learning in Health care and Computer Assisted Treatment:

Deep learning techniques were successfully employed in solving numerous human health issues such as skin cancer classification, arrhythmia detection, brain disease classification, fundus image segmentation, breast cancer detection, taxonomic classification of Covid-19 genomes, lung segmentation, discovering potential drug candidate against Covid-19 and survival prediction of severe Covid-19 patient [35]. Digital image processing in health sector has suffered a revolution in the last few years. Current method based on deep learning clearly outperform the previous state of the art, and their extrapolation to medical images analysis has shown very promising result in lung cancer detection [36]. With modern communication system, patients and doctors can contact each other via e-mails, online chat, or phone calls. All patient data are stored in a database where doctors or patient can access information from the database online when they need information. There has been a system name Deep patients, this system uses deep learning techniques to scan through health data stored about the patient to help predict disease risk. The goal of this system is to replace the traditional electronic health records. Doctors are unable to know everything they are supposed to know, so we are in the AI age where technology will be able to help doctors [27]. Computer aided diagnosis is also benefiting from recent development on deep learning, particularly in enabling the analysis of large, heterogeneous sources of patient data, such as genetic test, blood and cell samples, imaging exploration and unstructured information from clinical history of the patient [37]. Medical Software in the AIM system use many pictures of whatever they are testing to help determine what is good and what is not. With the AIM program, it will learn from

many images health hearts, when it detects an anomaly it will report it to the system user. The program is able to detect other errors because it will know what a healthy heart consists of and if there is anything that does not fit in this description it will alert the medical staff to that area [7]. The human diagnosis system, known as Human DX is a project led by the global medical community to instruct a patient on the best path to get help. In this project, experts are pioneering an approach to collectively super intelligence system by combining the collective intelligence of human with deep learning [38]. This system is to help those uninsured people to try to find the best step to be treated without seeing unnecessary doctors. The project is a worldwide joint effort that includes more than 8,000 doctors from over 80 countries and 500 medical institutions [37]. FDNA Inc., has announced the launching of a set of app; called Face2Gene, to aid in the identification and evaluation genetic disorder [34]. Systems such as these will take data points from a photo and compare them with the data sets that are programmed into the system from the patients with those diseases or disorder. This program could be created into phone application someone could download and use instead of visiting doctors. It is still advised to see a doctor but the app could give a good insight if you have any condition it can detect [26]. Another deep learning approach for health care is Random forest classifier use to predict the probability that a patient might develop a certain disease given their current clinical status. Random classifiers are used because they demonstrate better performances than the other standard classifier and are robust to overfitting problems [38]. According to [39] an effective deep learning approach can effectively modify the design model of computer-aided diagnosis (CADx). The modification could be of many benefits against the traditional framework of computer-aided diagnosis. The benefits of the modification are of three categories. First, with deep learning features are always uncover from the training dataset, the strength of clear amplification of feature extraction can be improve significantly. The feature extraction performed by the network neurons may replace and even outperform the power of the conventional feature extraction techniques. Second, the sequence and intersection of an image features can be jointly placed within the central structure of the deep learning neural network, so the process of selecting features can be simplified. Third, the phases of feature extraction, supervised classification and selection are perform during the optimization stage with the deep learning architecture. Deep learning architecture tune feature extraction and classification more simpler and straightforward [40]. According to [41] Machine learning differ from computer programming codes, it convert a given dataset of an algorithm into output using arithmetical information, data driven guidelines, that are inevitably formed from a huge set of sample, instead of programming it by the user [46]. Since the early days of machine learning, it has essentially required proficient ML specialist and skillful engineer to design a recommended feature extraction system capable of converting a given data into an appropriate representation, which the learning algorithm can use to perceive patterns. In the other hand, deep learning is a form of ML in which data is feed into the machine and the machine will use the feed data to create the required representation for the purpose of pattern recognition [41]. Deep learning technology can assist medical doctors and other hospital staffs by contributing second views and flagging related to image segments. With DL medical image diagnostics are extremely successful using CNN based

approaches, which is a greater achievement. This achievement is because CNN get to human level in its presentation for object classification job. CNN trained to classify image, which appears in an image [42]. Prognosis analysis can be done using deep learning techniques. This analysis is the technique for predicting disease development in medical practices. With this technique signs and symptoms of particular disease can be identified easily. The prognosis analysis can predict whether a specific disease may improve, worsen or stay stable for the meantime [43]. Using deep learning techniques for prognosis analysis helps to identify possible health issues, difficulties and probability for the patient to survive. In a medical setting a wider range of patient data known as multi-modal patient information is generated. The data may include proteomic, genomic, phenotypic, pathology, medical image and test results, this permits the deep learning method to simplify prognosis analysis [43].

3.2.1 Covid 19 Detection & Treatment with Deep Learning Approach

It is critical to detect the positive case as early as possible to prevent the further spread of this epidemic and to quickly treat affected patients [44]. One of the main threats of Covid-19 is its rapid propagation with an estimated 1.5 – 3.5 people getting infected by the disease upon contact with an infected person [45]. This implies that if 10 people are Covid-19 positive, they are most likely to infect 15 - 35 other people [46]. Therefore, Covid-19 can infect a very large number of people in a few days unless intervention measures are implemented [47]. All countries around the globe are trying to save their people's lives by implementing measures like travel restrictions, quarantines, event postponements and cancellations, social distancing, testing, hard and soft lockdowns [45]. More than the lives this virus has taken, the economic and social impact is far more disastrous and especially for developing and underdeveloped countries [48]. The most common test techniques currently used for Covid-19 diagnosis is a Real-Time Reverse Transcription-Polymerase Chain Reaction (RT-PCR). Chest radiological imaging such as Computed Tomography (CT) scan and X-ray have vital roles in early diagnosis and treatment of this disease [41]. Due to the low RT-PCR sensitivity of 60% - 70% even if negative results are obtained, symptoms can be detected by examining radiological images of patients [49]. It is stated that CT is a sensitive method to detect Covid-19 pneumonia and can be considered as a screening tool with RT-PCR [50]. Tao Ai et al [51] confirmed that the standard diagnostic techniques used is the Reverse Transcription-Polymerase Chain Reaction (RT-PCR) method [49], a laboratory procedure that interacts with other ribonucleic (RNA) and deoxyribonucleic acids (DNA) to detect the volume of specific ribonucleic acids using fluorescence. Recent findings obtained using radiology imaging techniques suggested that such images contained salient information about the Covid-19 virus [50]. RT-PCR tests are performed on clinical research samples of nasal sections. The samples are collected by inserting a swab into the nostril and gently moving it into the nasopharynx to collect secretions [51]. Although RT-PCR can identify the syndrome coronavirus 2 (SARS-COV-2) strain that causes Covid-19 in some cases, it produced a negative test result. Several studies have recommended the use of CT Scans & X-rays rather than RT-PCR owing to its limited availability in some countries [52]. The detection of the Covid-19 symptoms in low parts of the lungs has higher accuracy when using CT scan or X-rays than that when using RT-PCR [53]. However, they cannot exclusively address the

problem owing to the relatively limited number of radiologists, compared to new residents, and the high volume of re-examinations, of infected people who wish to know the progression of their illness [44]. To overcome the challenges of RT-PCR, CT scan and X-ray as well as to assist the radiologist, there is a need to improve the speed of the procedure. This can be achieved by designing advanced diagnostic systems that utilize deep learning models. The aim is to reduce the time and effort required to perform CT scan and X-rays of Covid-19 positive patients and evaluate the rate of disease development [46]. Application of advanced deep learning models coupled with radiological imaging can be helpful for the accurate detection of this disease and can be assistive to overcome the problem of lack of specialized physicians in remote villages [52]. Utilization of deep learning techniques for automatic diagnosis in the medical field have recently gained popularity by becoming an advanced tool for clinicians [54]. Deep learning, which is a popular research area of Artificial Intelligence (AI), enables the creation of end-to-end models to achieve promised results using input data, without the need for manual feature extraction [45]. Deep learning techniques have been successfully applied in many problems such as arrhythmia detection [55], skin cancer classification [53], breast cancer detection [56], brain disease classification [49], pneumonia detection on chest x-ray images [57], fundus image segmentation [58], and lung segmentation [59]. On the other hand, the Covid-19 epidemics' rapid rise has necessitated the need for expertise in the field of AI to come up with a robust deep learning model for efficient Covid-19 detection. This has increased interest in developing the automated detection systems based on deep learning techniques. Simple, accurate and fast deep learning models may be helpful to overcome the Covid-19 detection and diagnosis problems and to provide timely assistance to patients. Additionally, deep learning approaches can be useful in eliminating disadvantages such as insufficient number of available RT-PCR test kits, test costs, and waiting time of test results. Similarly, a well-trained deep learning model can focus on points that are not noticeable to the human eye, and many serve to reverse this perception [50]. A deep learning model can be used to initially evaluate a Covid-19 patient as an alternative solution to traditional approaches that are time-consuming and labour-intensive [53]. Hemdan et al., [60] uses a deep learning model to diagnose Covid-19 in X-ray images and proposed a Covid-Net model comprising seven CNN models. [61] Proposed a deep model for Covid-19 detection (CovidNet), which obtained 92.4% accuracy in classifying normal, non-Covid-pneumonia and Covid-19 classes. Narin et al [48] achieved a 98% Covid-19 detection accuracy using chest x-ray images coupled with the ResNet-50 model. [57] Classified the features obtained from various convolutional neural network (CNN) models with support vector machine (SVM) classifier using x-ray images. Their study stated that the ResNet-50 model with SVM classifier provides the best performance. There are several recent studies on Covid-19 detection that employed various deep learning models with CT images [62]. Deep learning can be applied for multi-temporal classification of X-ray images in order to evaluate the Covid-19 evaluation and hence draw a vital prognosis for infected patients [63]. RNN & CNN architectures can be combined together in order to assess the temporal evaluation of images, and hence classify the time series into two main classes: positive and negative [58]. Evaluation such as classification can help doctors to guess a vital prognosis for a patient in a critical situation [52]. Deep learning

has contributed in the battle against coronavirus disease [64] pandemic in fact, various deep learning methods and application have been proposed to fight against Covid-19 from medical data analytics, image processing, text mining, natural language processing and internet of things, to computational biology and medicine [16].

3.3 Smart Vehicles & Global Positioning System (GPS)

One of the popular intelligent system is autonomous system i.e. independent self-directed technology. A good example of autonomous system is self-driving car popularly known as smart car, which uses deep learning algorithm to process information from it surrounding and making decisions on those factors [1]. Smart cars can drive completely automated and they be smarter than the human drivers are. In autonomous smart car, there will be many different sensors and they would constantly be taking with the system allowing it to use algorithm in deciding what the next processing it need to perform. There are a number of light sensors on the car to help the system to determine complexity. The system is able to use the algorithm to detect changes in shadows and light to follow whatever the algorithm decided to tell it to do. The algorithms could tell it to move forward until it detected change in shadow then make a turn and continue going [65]. When there are more automated cars there will be less accidents [37]. As they have sensors that detect anything, we can perceive such as stopped car in front of the smart car or changing road condition. With the help of the sensors, the automated vehicle observed it surroundings and it then takes these observations and make decisions from that information [66]. Numerous cases and reasons encourage the use of intelligent vehicles on our roads system as well as global positioning system themselves. Car manufacturing companies and researchers are putting intensive efforts in creating more sophisticated autonomous vehicles. When teaching such vehicles some crucial driving activities the manufacturers and the researchers must program many things for the vehicle to learn from the driving information. Such things includes when the car need to stop for refueling when it need maintenances and adjusting trip routes based on the speed of the car [8]. The smart cars must be program to use voice-recognition system to know where the person in the car want to go. These vehicles are equipped with smart in-car cameras system and sensors to record real-time videos and to sense the present of objects during driving. The storage capacity of the system internal memory is insufficient to store all the captured real-time videos. Therefore, many interested parts of the videos objects may be lost. With the object detection techniques, the smart in car camera could find the video section that have object of interest. Such videos sections of interest may be uploaded to the system cloud-computing platform for further scrutiny, while the undesirable video sections could be deleted to allow more storage space. Thus, a deep learning technique is designed in such smart cars for object detection. The deep learning technique does not only offers detection ability but also take care of system maintenance [67].



Figure 3: This is an interior picture of the hands-free Tesla vehicle [67].

According to [68] Deep Learning has achieved a remarkable outcome during and after the computation of object recognition. The application of image recognition such as semantic segmentation and object detection need for selves-driving vehicle are in progress. Most of researchers that conducted their research on self-driving cars using deep learning model, teaches the vehicle to learn the environment around it through smart-in-car- camera and light detection sensors. A suitable trip positioning is decide by motion forecasting, and the mechanism for valuing the vehicle is determine by it driving capabilities [67]. The deep learning based semantic segmentation and object detection. Currently used to teach the autonomous vehicles to understand their surrounding environment. With growth in Convolutional Neural Network (CNN) investigation, end to end learning based approaches has recommend to deduce the control the vehicle value directly from the feeding in image [69]. With these approaches, the CNN is trained with the dashboard smart in car camera during a person driven. The car control value and the frame resemble to each other as learning data. The end to end learning technique of self-driving car control has the benefit that the method of configuration of the system is easy since convolutional Neural Network learn automatically and constantly without clear familiarization of the nearby environment and motion preparation [40]. In the other hand the vehicle global position system often, calculate the time it will take for someone to make a trip from their current location to their destination. When the system is calculating the trip time, it must use factors such as weather, road traffic, roadwork, and vehicle crashes that have been reported [50]. The GPS gives warning if there is roadwork a head or if there have been reported accident. After it report this information to the driver, they will be able to change the route if they want to and the GPS will then calculate the new time of the trip. Programmers are constantly finding ways to teach intelligent system how to learn human activities using deep learning techniques. When the driver is using global positing system (GPS) on google maps, the system can detect the condition of the traffic and change driving direction if the road has any traffic difficulties ahead or anything else that may stop the their trip time. When the traffic network is available, the GPS system will monitor the traffic speed and traffic congestion ahead. The system then notify the driver and decide for the next available faster route, if the driver accept to go ahead on fast alternative road. In addition, the GPS system can assists the driver with traffic details that may include current speed limits and other road conditions [34]. One of the transportation company that

operate the smart vehicle transportation system is Ubers Technology, Ubers is a pear to pear transportation company, that offer an efficient and adequate transportation services, which is better than using taxi services. When a passenger need to use a hired car for a short ride service around the city he may need to use a taxi dispatch and hang around for the taxi driver to arrive where he is waiting. But today with the modern technology of Uber transport services one can only tab an application button of Uber system on his phone, which will uses it technology to locate the nearest Uber driver for the waiting passenger [29]. With Uber app driver arrive to the location of the passenger sooner than taxi can arrive. Approximately less than one minute in dense city. This technology uses deep learning techniques to find a suitable driver for the passenger who need car for an Uber ride. This is done by the system when it automatically looks around through the GPS application to locate the nearest driver for the ride [45].



Figure 4: City mapper's multimodal car & transit routing mobile App for Uber car riders [24]. Another important application of intelligent system is the use of deep learning algorithm in controlling the road traffic. This type of system are installed on the road to operate the traffic light to decongest the road traffic. Research efforts on intelligent technology assists these traffic control systems and driving pattern technology to learn and coordinate traffic situations.. The systems uses deep learning approaches to reduce stoppage when a car arrived to stop light in a crossing [70]. In 2015 the World Health Organization (WHO) global status report indicate an approximation of 1.2 million annual loss of life due to road accident worldwide [4]. With an estimated of 89% of the accidents is due to human errors, selves driving cars will play an important role in reduce the number of accident cause by human error to save lives. With the capability to move the job of explicitly, framing rules to develop a system that will learn those rules to perform some task. Deep learning techniques will play a vital role in actualizing this mission. Selves Driving Vehicle will offer better mobility for age-old and disable people and could decrease energy consumption by 90% [71]. Additionally, it resolve the transformation into fewer road traffic overcrowding and related air pollution [72].

3.4 Smart Environment & Smart House

In automated society, intelligence system such as regulating machine can regular house hold consumption of energy system, it also be able to alert the owner if there is an issue within the house such as fire [73]. The deep learning systems in the household have increased the whole efficiency of how people work and survived. People have adopted to live and appreciate these new trends of AI, but some will still want to be in control of things they are doing [65]. With the current deep learning

techniques and a strong internet connection, China has built and started running a gigantic interconnected public surveillance network called the social credit system. The system is used to track and monitor the movements and activities of every person of 1.4 billion citizens. People are forced to download a mobile application on their smartphones that may be view and access all the images on their phones. With this system, all citizens are ranked based on their activities and attitudes; this is used to reward a citizen or to punish him depending on their performances [72]. Currently home computerization is becoming more popular due to its numerous benefits. House mechanization is a system in which all-home appliance and house features are control through remote control or local networking system. With home-automated system, deep learning model provides the house occupants with real-time action and computerization framework for internet system [74]. The framework will focus on the concept of house computerization in which smartphone data is use to recognize human activities. DL model is an effective system for recognizing human activities in computerize home [74]. Such system uses deep neural network with 4 hidden layers, the network is pre-train layer by layer neural network that uses an algorithm known as Restricted Boltzmann Machine. The development of such automated system is required in order to reduce the cost of formal medical care and to improve the productivity of those individuals who need to stay independently in their home. Such individuals need to perform their daily living activities (e.g. dressing, taking medication, eating, drinking, sleeping and reading) independently. The development of home-automated system for recognizing human activities is an important step-toward monitoring individual health and assisting them in performing their daily activities efficiently [49]. Thermostats is an important home-automated system that people possibly do not talk-about when thinking about DL system for smart houses. The thermostat learn and adopt from the activities of the occupants of the house during the first week of it installation. The thermostat learn to customized the accuracy of the home temperature using the occupant's usual settings. The system can keep the temperature cool in the night, warm in the morning and set itself into energy saving mode when the occupants leave the house. The system uses the occupant's smartphone sensor to know if they are not in the house. In addition, the occupants can set the system to control house energy usage by setting it on energy saving mode [38]. The intention of people and government in the area of modern building could further likely to have human like manner. When we sweet we release heat from our body, modern intelligent building will be using an intelligent rain observing floorcovering carpet to act as sweet to cool the building when rain evaporates. Our body use constrict or open blood vessels to preserve or release heat. Intelligent building will use smart adaptive transparent intelligent windows and shade to preserves heat. For over centuries win catching and win tower have been used for natural breathing in the buildings [75]. This old system will be replace with predictive and automated self-heating concrete and modern architecture. Modern win energy towers, renewable generators, and turbine designs will escalate building and structure grid islanding.



Figure 5: Frontal View of a Smart House [30].

3.5 Music and Movies Streaming Services.

Another form of web application, which uses deep learning algorithms, is music and movies streaming systems. The influence of deep learning technology on the way we discover music and movies. Internet and internet of music streaming transformed the music industries, streaming is now the primary way we listen to music and watch movies and this transformation is only at its beginning. These systems uses your previous watched shows and music playing list with your rating to find new recommendations for you [42]. Until now, the way we listened to recorded music was tightly linked to a relatively clear business model. Consumption being done via media such as personal CD-player, IPod, etc). This is call ownership model; under this model once the item is purchases, the job of creators, producers and distributors is done. It is the listener who may decides how and when to enjoy their music. With the advent of current day streaming system, we are witnessing a shift from ownership to access. There is an opportunity for content producers and distributors to guide listeners in their consumption [10]. The two web streaming services for music and movies namely Netflix and Spotify. Netflix is streaming service that offer a wide variety of a warding TV shows. Movies documentaries and more thousands of hundred connected devices [42]. This streaming service uses deep learning techniques to help optimize video for mobile devices. The system uses an optimization algorithm called dynamic optimizer to reduce the amount of data in a video file without losing image quality. The dynamic optimizer make it easier for the users to watch without re-buffering [69]. In the other hand Spotify, which is a music streaming service that gives the listener instant access to millions of songs ranging from old favorite to the latest hits. This system open the way to much more holistic experience and in return, the listener now require to be assisted in all aspect from discovery, browsing sorting through enormous collections of tracks [10]. This is the crucial part of music and video streaming that led industries to be competing. Currently diverse music and movies producing companies are developing new products of a greater streaming speed such as personalized playlist, radio-like lean back proposition, etc.; these are aiming at defining new format of music listening [65]. With the current trend of deep learning techniques, it is easy to develop a recommendation algorithm that has the responsibility in helping the listener to navigate through, and filter the flood of content [42].

3.6 Web Application & E-mail Spam Filter

Another system that uses deep learning technique is spam filter in our e-mail. The spam filter is one of the deep learning techniques, it constantly continue to learn key words, phrases, and information on who is sending this email. This is how companies such as google and yahoo filter spam out of your inbox [72]. In the other hand websites such as Turnitin and other antiplagiarism programs uses deep learning techniques in trying preventing people from stealing ideas and passing them off as their own. According to [76] E-commerce classification issues can be solve with the help of deep learning techniques, where a simple CNN can be feed in with word-based content that have pass previously numerical encryption through the bag of texts model. [10]. Amazon is an online e-commerce website operating company, which make online purchase recommendations based on the user online activities. Amazon learn to know the user favorites items from its website based on his previous online purchases or his frequent online activities [65]. One of the most inspiring example of deep learning techniques is the use of Cortana or Siri. The two are both voice recognition systems that uses deep learning neural network to mimic human collaborations [22]. Facebook is one of the modern company that utilized deep learning technology to scan person image and search through the person friend list to quickly tag a person friend. This deep leaning technique is called Deep Face. It is also use to detect different features in the human face at the detection rate of 97% accuracy [8]. Google email account uses a deep learning intelligent spam filter for Gmail services. This service uses a deep learning approach to filter about 99.9% of the spam mails out of Gmail account inbox and send them into person spam folder. With deep learning intelligent filter it is difficult to have spam emails in person inbox since the intelligent spam filter will search database with lot of pam emails to understand how their messages are organized [77].

3.7 Deep learning for Military

The concept and knowledge that led to the development of computer system has design for the computer to function and perform a given task accurately required human intellect, such as speech recognition, visual perception, translation between language and decision making. Deep Green system was developed in 2008 by Defense Advance Research Project Agency. This deep learning technology was developed for the military strategic commands and system control, which assists commanders to realize and appraise more tactics that are substitute and strongly manage an operation [78]. According to [79] In the military setting, the impact of intelligence technology appears in all domains such as in the land, in the air, in the sea, information and space as well as all aspect of warfare that may include operation, strategic, tactical and political levels. For example, in the strategical and political level, deep learning technology is used to disrupt an enemy by fabricating and publishing enormous amounts of false information. In this situation, intelligent technology could enhance partially self-directed control in unmanned systems so that human actions can work unmanned method more proficiently, to eventually increase battleground influence [32]. Modern intelligent systems based on deep learning approaches has transformed the performance of old-fashioned machine learning application such as QA system [80]. Speech recognition and machine transformation [78]. Current improvement in this technology has almost revolved other inventive ideas into amazing application capable of lip reading, image captioning, video synthesis, voice

imitation and continuous control [11]. These outcomes propose that a system, which is proficient of programming itself will have the ability to (1) perform specific tasks at a superhuman level (2) improve efficiency with respect to the development cost of both software and hardware (3) provide objective and fair decisions where humans are known for being subjective, biased, unfair, corrupt, etc. Stirred by the impression of transfer learning in actual life situations, deep transfer learning is imminent to resolve the challenge of data shortage in military object recognition [80]. It chains both the transfer learning and deep learning neural network together, captivating both benefits of big model size of convolutional neural network and previous knowledge delivered by some existing huge dataset [19]. Deep transfer learning is comparable to fine-tuning; a frequently used training technique in DNN, and is extensively used in numerous application. The modification among our deep transfer learning and fine turning is the best for reequipping layers.



Figure 6: South Korea Military Robotic System [35].

3.7 Smart Manufacturing

Smart manufacturing is all about using new ideas of intelligent manufacturing patterns where manufacturing technologies are full linked via wireless network. These technologies are to be supervised by sensors, operated, and controlled by innovative computational artificial intelligence models [77]. These intelligent technologies are used to increase product quality, system efficiency, and sustainability whereas to minimized costs. [36] Said Smart manufacturing means utilization of cutting-age technology to accomplish physical sciences to enhance the effectiveness of data analytical solutions for decision making with enormous utilization of sensors and availability of internet connectivity. There is an urgent need of handling vast manufacturing data categorized by high velocity, high volume and high variety. Current improvement on Internet of Things, cyber physical system, cloud computing offer greater helping technology to improve modern manufacturing [29]. Through leveraging such new intelligent systems in manufacturing, gathering data from various angles of a manufacturing process life, ranging from raw material, machines operations facility logistics and even human operators are gathered and process [79]. By automated feature learning and excessive volume molding abilities, deep learning offers a progressive analytics model for smart manufacturing in this era of big data. It utilize a network of progressive connected layers of nonlinear processing that learn the similarities of data matching of various levels of concept [81]. As an advance of machine learning, deep learning exhibits an excellent performance in numerous

applications of image reduction, speech recognition, natural language processing such as understanding, translation, test questions and answers, games and multimodal image text. Deep learning permits automatic data processing concerning extremely nonlinear and multipart feature abstraction through a cascade of several connected layers, as a replacement for traditional machine learning optimal feature representation of data by means of domain knowledge [82]. In modern hotels, Robots takes over luggage duties. The robots are capable of leading you into the hotel and take you to your room. These robots can deliver room servicers effectively. IBM has powered Hilton hotel with the first world Watson enable hotel concierge known as Connie. The robot is a greeting doorkeeper robot to welcome quests at the entrance door. These robots is capable of doing many things a normal doorkeeper could do. The robot is more of a customer care services. Connie is currently, learning to interact with quest and responds to their queries. Connie can recognized responsive question, which quest may ask, each interaction with the quest allows the system to learn, adopt and improve it recommendations [77].



Figure 7: Connie receiving quest at the door entrance in Hilton Hotel [24].

3.8 Deep Learning with Banking System

Traditional fraud protection methods for the banking industry have been rule based, where a human defines the rules. About 90% of the financial and banking institutions rely on these methods. While more persons adopted new technologies, more fraud scenarios may happen, making those rule based methods not scalable and sustainable in the future [45]. Moreover, false positive (i.e. non-fraudulent transaction that are cataloged as fraudulent) cause millions of dollars of last transactions and customers complains in the banking industry, and rule based methods are part of the problem [83]. Frauds have no contract patterns and they always charge their behavior over time making rule based system cumbersome and rapidly obsolete [84]. The need for new approach is evident. A good fraud detection system should be able to detect the transaction in real time and with accuracy [85]. Deep learning is making inroad across the banking value chain. Immediate applications involve achieving productivity gains and development productive compliance/risk management system [86]. There are sets of deep learning algorithms that have been tested in fraud detection with excellent result. Auto encoders (AE) and Restricted Boltzmann machine (RBM) are the most commonly used Deep learning for detecting fraud in banking industry. Deep learning based system is estimated to save over 36,000 hours of lawyers and loan officer work every year [87]. Deep learning algorithms are typically used to solve classification or

regression problems, in Bank industry, where we want to predict if a transaction is fraudulent or not [85]. Deep learning can generate customer insights that can be used for personalized communication advice. Offer and services. Labor-intensive work like compliance reporting new customer on boarding communications, and documentation can become highly accurate and efficient with deep learning powered automation [83]. The banking sector has been a pioneer in the adaptation of new technology and resulting innovation but their ability to realize the full potential of data has been limited so far. In the last couple of years, global financial institutions have started use deep learning techniques to improve customer engagement and product/services personalization. Despite all eagerness to reap the benefits of AI technology, banks are slow to adopt new solution of Deep learning [86]. Deep learning can enable banks to provide quality advice to customers by removing human errors. Deep learning powered personalized financial management tools hold greater potential in the market. Deep learning helps banks to reduce production cost by 13% [45]. Deep learning increased potential for real-time sensing and improved ability to stop anomalies make it highly valuable in this regard [87]. According to MC Kinsay & company estimates, banks do not realized the value of more than 80% of the total data collected by them [83]. During the last decade, banks across the globe have gone on strong digitization drives, which have laid the pillar for deep learning adaptation, the banks have been following a watch learn act approach, which make them slow partners to work with startup [86]. However, used of deep learning in banking has let to 17% average revenue increase. The shift from pure statistical regression to deep learning for credit analysis increased mortgage collections by over 30% [88]. The application of deep learning in the management of banking risks such as credit risk, market risk, and operational risk has been explored. New products, services and risk management techniques are being enabled through the application of evolving technologies and advance analytics. Deep learning identified as one of the technologies with important implications for risk management, can enable the building of more accurate risk models, by identifying complex, nonlinear patterns within large dataset [89]. Deep learning delivers the capability to detect meaning full patterns in data, and has become a common tool for any task that can assist the banking sector to operate effectively [95]. It is expected that machine learning will be applied across multiple areas within banks risk organization. Deep learning has been recommended as an initiative that could help in the transformation of risk management function in banking [90]. New regulations have also pushed the banks to automate with the need to have efficient regularity compliance [91]. A big push towards the digitalization of services and increased regulatory reporting requirements has resulted in a large amount of unstructured data being created and/ or frequency. These data come from various sources, including consumer application, client interaction metadata and other external data sources. Deep learning also plays a role at the Securities and Exchange Commission (SEC) in the risk assessment process in identifying misconducts in computational finance. The adaptation of deep learning has been motivated by the potential opportunity for cost reduction, improved risk management [84]. The desire to enhance their analytical capabilities and automated across business links, including risk management by managing and mining, this increased volumes and variety of data has led financial institutions to explore powerful and analytical solution [87]. Support Vector Machine

(SVM) couple with Convolutional Neural Network (CNN) are successful in classifying credit card customers who default. They were also found to be competitive in discovering features that are most significant in determine risk of default when tested and compared against the traditional techniques [80]. Deep learning has great potential and could be variedly used ranging from the comprehensive exploration data analysis to the presentation/visualization of modelling results [84]. Recently deep learning techniques is employed to address the Fraud Account Detection (FAD) issues based on analyzing the transaction trading behaviors [90]. The reason why CNN architecture has been widely used can be listed as follows:

- It is flexible structure, which is easy to transfer into other Scenarios
- CNN extracts the features automatically
- The good scalability of CNN network structure makes it successful to address many classification problems.

4. Related Work

Deep learning' has achieved very impressive results in solving many challenging problems that affects AI system. It has turn out to be the most hopeful AI technology ranging from LeNet, AlexNet to GoogleNet and so on [28]. This technology has displayed it abilities for solving numerous challenging problems in the field of computer vision [4]. Its detection capabilities and performance surpasses other machine learning classifiers, which depends on traditional feature extraction techniques. Deep learning achievement in image processing tasks have fascinates attention from other areas of study. Such as Natural Language processing, sentiment analysis, health care, region of interest localization and description [29]. This achievement of deep leaning is related to three factors. Fast computational hardware, advance numerical optimization and growth of data volume. Abuzneid et al. [32] in their study, they intensively improved the deep leaning application of stacked-de-noising-auto-encoder for the variation of different kinds of lesions and lumps with number of image modality. Their investigation shows that the deep leaning model can effectively alter the design model of computer aided diagnosis framework for many benefits again the state of the art convolutional design models. Rav et al. [23] Explicate deep learning methods in healthcare, they focus their discussion on reinforcement learning, natural language processing, and computer vision and generalized approaches. They define numerous ways where the above computational methods can effectively improve many areas of healthcare. They explores how to developed end-to-end model. Their explication on computer vision largely depends on medical images. While description of natural language processing is subjected to electronic medical record data. Eraqi et al. [68] Their paper, outline numerous fields of healthcare that influence the use of DL technology ranging from privacy, security, efficiency and accuracy point of view and various challenges that affects DL technology. However, possible deep learning methods were presented that will ensure safer privacy, security, efficiency and accuracy preserving DL models for medical care. In addition, they gave an insight of present DL research problems and highlight promising area of focus for future research. Manu et al. [74] Developed a smart house system that uses deep leavening model to recognized human movements and activities over a Long Short Term Memory DL algorithm and then make a predetermine job to achieve the recognition activities. Wireless sensor data mining was use for the smart house. Their Long Short Term Memory system can sense

human activities and movement from almost 200 time-step with activities recognition rate of 97% accuracy. Manic et al. [75] In their study, they outline the importance of future smart buildings from the range of viewpoints. The study have gave an overview of U.S. projection on future intelligent buildings by presenting the concept of integrate units of smart grid. The paper talks on the impact of networking and interoperability as well as existing challenges and solutions in the area of resilience, security and human in the territory of intelligent building. In the study, they outline the most important features of smart home and smart grids, expounding further on the interoperability among the two. Fabrizio et al. [76] indicate that DL model can effectively handle e-commerce. In this study, the authors address a text classification job, where a deep learning algorithm learned to deduce an Italian enterprise operating an e-commerce within the word-based content of it website. In achieving their aims, they developed a robust processing pipeline and assessed it efficiency via wider experiment. The propose pipeline uses CNN and it depend on word embedding to encrypt text data into grayscale image. The experimental shows that their system has surpass all the other machine-learning techniques previously tested on an equal task. Apart from better classification, the model displays other wanted properties. Rimmer et al.[92] In their paper "Automatic website fingerprinting through deep learning" they show that an opponent can mechanized the feature engineering procedures and inevitability de-anonymize Tor circulation by adopting novel approach based on deep learning method. The study uses more than three million traces of network, regarded as the major dataset of websites traffic, which has not been use before for website fingerprint. The experiment result indicate that the performance rate achieved by their deep learning method is same with other known approaches, which have achieved a successful rate of mother 96% of about 100 website. They indicate that the hidden features learned by their deep learning method are far stronger to dynamic modification of website contents. They agree that their effort to automatically develop the greatest applicable traffic features and perform correct traffic recognition qualify their deep learning based method to be flexible, robust and efficient technique for web fingerprint. Wang et al. [93] developed an intelligent camera for smart car that uses mobile cloud platform for deep learning. This intelligent camera is capable of sensing an object in real-time videos throughout the driving time. Then it may recommend the right part of the video to be kept in the mobile cloud. The deep learning model warehouse and the train's procedures are kept in the cloud, while the data gathering and recognition process are kept in the mobile memory. They used NVIDIA Jetson TK1 to implement the mobile side, whereby the communication is done through Git protocol to make sure the data transmission is successful in an unbalance network domain. They carry out an experiment, which indicated that the system-detecting rate has reach out four-network-frame in a second on Faster Region Based Convolutional Neural Network (R-CNN). Fuji Yoshi et al. [30] Proposed to designed a deep learning algorithm that will learn graphical and dynamic progressive motivated driving. A Convolutional Long Short-Term Memory Recurrent Neural Network (CLSTM-RCNN) was used to achieve this self-motivated driving. In addition, they introduces the positioning the angle of steering wheel by taken regression problem as classification then striking a longitudinal relationship among the output layer neurons. This technique is grounded on knowing sinusoidal function that encrypt steering positions. They used

public available dataset from Comma.ai for the purpose of training and validating their propose approaches. Their system enhance steering root mean square error with 35% above current state of the art. This improve steering stability by 85%.Chen et al. [56] Explored the way deep learning is useful in every modern image recognition job and the way it resolve and define the development of deep learning system of self-direction driving vehicle and its associate challenges. Yang et al. [94] performed a study that explored the impact of deep learning approaches in military command and control systems, as well as boosting decision support for processes that offer a common operative representation. The system utilized a threat analysis to make prediction on the actions of the enemy, and to study ways of organizing personal forces of actions to take before execution. The investigation made in the study has shown various deep learning standpoints, by identifying different fields in which DL are likely to play a vital role. This study shows that deep learning technology is beneficial for the military in providing serious coordination support whenever there is shortage of time or if there is many choices, which are more difficult to analyze. Svenmarck et al. [78] outline some prospects for utilizing deep learning technology in underwater excavation warfare, military surveillance system, and cyber security. Additional possible application are reconnaissance using partially self-directed automobiles and sensor technology, risk evolution in air defense systems with great progressive requirements, intellect investigation of evolving patterns, directives and control system, training and education. Still, military applications of DL need to deals with numerous challenges. In this study, the authors present outcome from current mission of identifying the likelihoods of using DL military application, as well as how to solve the challenges. Masi et al. [13] stated that CNN is powerful for overall object recognition. However, its outstanding performance hinge on massive training dataset. Deep learning technology is confronting job such as military object recognition, in which image dataset for training are scare, its presentation will reduce suddenly. The authors proposed to address these problems by proposing to use deep transfer learning technique. The foremost idea comprises of two portions; transfer learning for previous knowledge embedding and mixed layer for greater feature extraction. It has been delivered that the capability of feature extraction learned in huge dataset is supportive to connected jobs and can be moved to novel neural network. Fixing the network weights of some layers and then retraining the remaining layers will resolve in successful transfer learning process. Gao et al. [29] conducted an extensive survey of frequently used deep learning algorithms and discourses their adaptation in the direction of creating manufacturing "smart". The evolvement of deep learning technologies and their benefits above old-fashioned machine learning stand first deliberated. Successively, computational approaches based on deep learning are generally offered for increasing the system performance in manufacturing. To acceptable an enhance smart manufacturing needs global perceptions on application of smart manufacturing technology. In respect of this, we recognitions effort made by researchers in conducting an intensive research in the field of deep learning. A number of deep learning based techniques, such as convolutional neural network, deep neural network, etc., have now been recognized in the manufacturing industries to attain supportable manufacturing process.

5. Conclusion

This paper presents a reviewed of deep learning approaches in contemporary society. The paper has explored the impacts of deep learning approaches in shaping the use of AI systems in numerous field of study. The used of this technology has effectively improve the way of human lifestyles and it led to the building of more organized automated society. Deep learning model is increasing it potentials in almost all fields of human endeavor; this enables the computer system to do a job at a faster speed and more proficient than human. This may encourage the employers of labour to start using the machine as replacement of human employees. This philosophy may become real, but the usage of this technology may also create new jobs before taken away others jobs. It is a forbidding situation to talk about employees might lose their jobs over automated machines. However, it is yet to be proof, but many studies have talk about this issue. Studies shows that these machines may possible replace human tasks rather than taking away their jobs in the future, and create new jobs opportunities. However, the new opportunities that will emerge are difficult to think up at present, unlike the existing ones that are possible to be lost [72].

ACKNOWLEDGEMENT

We would like to thank University Sultan Zainal Abidin especially Faculty of Informatics and Computing and UniSA Research Management Centre (CRIEM) for supporting this study academically and financially.

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