

Fissures in machine learning prediction due to change in human behavior in covid-19 pandemic

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Abstract. Change is the only constant thing which appears after every fixed time span in this world. As we know all the automation or machine learning algorithms were build on the normal human behavior data, which does not specify any abrupt change in the human behavior. But due to the covid-19 pandemic the things have changed and such is the human behavior. The main focus of this paper is that due to the sudden change in the human behavior machine learning algorithms or artificial intelligence are not able to predict the things as per situations. The case is not that machine learning algorithms or artificial intelligence is bad but how to handle such unexpected behavior prediction. How machine learning algorithms or artificial intelligence can handle sudden destructions/disruptions in human behavior change due to covid-19. This paper gives the best direction towards for all artificial intelligence people, data scientists, telecom persons and different developers to understand the things in different way as the human behavior changes at a particular time frame.

1. Introduction

Understanding human behaviour means the human social psychology evident in the existing social media interactions available in social networking sites. Due to the popularity of social networking sites a large information base is created and their influence on users, this has become an important area of study for researchers. The biggest global challenge of our lifetime is the covid-19 event. It is forcing the organizations to think or respond to the changing human behavior and attitudes. However, the need to respond won't end when the covid immediate threat eventually reduces. It has altered the experiences of being an employee, a citizen, a customer and a human. There are behavior shifts for some time to come. on 30th January 2020 health emergency was declared of international concern. As first case of covid-19 was reported from the Kerala on 24th March 2020.

National lockdown was declared by the government of India. The global and health care system has badly affected and created physical, economic and psychological challenges to human beings. In the 2nd wave of the covid-19 India has seen sever health crisis many people died without proper treatment, due to lack of oxygen and essential medicines. Several human behavior measures where suggested by the government, like use of masks, hand hygiene, quarantine / self- isolation, social distancing to curb the crisis. In order to control the covid-19 crisis in depth study of human behaviour at individual level social group levels and civil society as a whole has to play the significant role. Both positive and negative behaviours of individuals must be analysed at individual, social and policymaking levels. Social dilemma caused by negative behaviours must be taken care of as collective and selfless behaviours will be effective instruments in combating the cold 19 pandemic through the prism of human behaviour science.

Widespread behaviour and social changes are critical for mitigating the covid-19 impact (Van Bavel et al 2020) [1]. In the absence of a vaccine or definite treatment human behaviour can be align it with the help of social and behaviour science with the recommendations of public health experts and epidemiologists. Unique opportunity is presented by covid-19 pandemic to the social scientists at natural experiment cuts across many social economic groups and all cultures. As reported in a United Kingdom survey (Mental health Covid-19, 2020) that the people affected by psychiatric, emotional and behavioral disorders are at

more risk contracting covid-19. Due to the scope of global pandemic many research groups were brought together around the world as never before. They can test inventions and ideas more rapidly with so much simultaneous interest. The Van Bavel's group of more than 40 researchers around the world brain stroke outline the best way to come out from covid-19 crisis by behaviour research that might inform or improve the response to the coronavirus at a time when people are sceptical scared and in undated by information.

2. Back ground research

Due to the human behaviour changes in the pandemic like our buying of commodities, medicines, hoarding and selling essential commodities with higher prices behaved selflessly at the cost of others. Machine learning models were used to predict the covid-19 virus. In order to reduce the more mortality rate to covid-19 diseases a good prediction module is needed. Using a machine learning algorithm to identify the most suitable algorithm systematic literature survey is needed. Electronic devices with artificial intelligence can play a pivot role in controlling the spread of this disease. Using statistical data a mathematical model can be built by machine learning algorithms these algorithms learn from the data feed without any human interference.

(Kolla Bhanu Prakash et al 2020) [2] In this work analysis prediction and evaluation is carried out on the 19 datasets by using machine learning algorithms. The virus created unpredictable havoc in the human lives throughout the world. Analysis using machine learning is done in this work on covid-19 data sets with different age groups. Different machine learning models are used for the prediction of the covid-19 virus and their performances are computed with different testing and training data sets.

(Soudeh Ghafouri-Fard et al 2021) [3] In this work prediction and the future trends of the covid-19 virus is predicted by using machine learning algorithms and deep learning approach. Different state strategies are presented in this study harder control of the virus and application of machine learning program for the prediction of covid-19 virus. Anuradha kunal Shah et al 2020) [4] has presented some commonly seen human behaviour during the covid-19 crisis. As the covid-19 is a novel virus with no vaccine available some protective behaviour are suggested. Regarding the likelihood of containing the disease social distancing, health seeking behaviours, dis-commentary behaviour, misinformation herd behaviour and psychological behaviour were discussed in this work and educate knowledge about these human behaviours can control the pandemic crisis up to some extent. A scoping review paper presented by M Rubaiyat Hossain Mondal et al [5] which provides a systematic review analysis of Deep Learning and Machine Learning techniques. In the application of Artificial Intelligence fighting against the effects of novel corona virus disease (covid-19). The scoping review is performed by reporting items of systematic reviews and meta-analysis (PRISMA) guidelines on Artificial Intelligence for covid-19. Results show that residual neural network (ResNet-18) and densely connected convolutional network (DenseNet 169) exhibit excellent classification accuracy for different parameters.

A Supervised Learning Approach suggested by (Mujeeb Ur Rehman et al 2021) [6] shows machine learning algorithms are used to propose diagnose covid-19 infected patients more effectively. In this proposed diagnosis method several symptoms were taken into consideration, such as immunity status, body temperature, flu symptoms, diarrhoea, throat pain, voice type, headache, joint pain, vomiting, dry cough, breathing problems and chest pain. Based on these symptoms a machine learning model was proposed which is able to predict the probability of contamination with the covid-19 virus. Method is evaluated on different experimental analysis metrics such as precision, recall, accuracy, and F1-score. The obtained experimental results have shown that the proposed method can predict the presence of covid-19 with over 97% accuracy. Monali Gulhane et al 2021 [7] presented a review paper where in the human behavior analysis through different body parameters, food habits, social media influences and social behavior of the person were examined. The analysis of these different area parameters to predict the early signs of the diseases was the main objective of research. Social behavior and eating habits which play a vital role in disease detection was formulated using CNN optimum choice of classification of

diseases. The training speed of the CNN is reduced and feature selection and extraction is automatically managed by the CNN layers. Atanu Ghoshet al 2021 [8] a human Behaviour analysis presented in his work suggests that collective behavior and selfless individual will be an instrument for effective responses to combat the pandemic. The actions of individuals, groups and the state play a significant role in alleviating the covid-19 crisis. Human behavior was analyzed from various contexts like social, policy-making levels and at individual levels. Both positive and negative behaviors of a human were identified during this pandemic. On the positive side, the building up solidarity and sense of togetherness were analyzed. Some negative behaviors were also observed, where some people acted selfishly to maximize their utility without thinking about society. Such negative behavior led to a 'social dilemma' state and created negative externalities to the community. Dastur 2019 in this paper the theoretical field of social psychology is discussed and practical significance by informing the policymakers on tackling the panic amid pandemic. In India we found neutral approach for flow of information which leads to anxiety. The governments may address the flow of information in interest of transparency, so that the outcomes in the form of anxiety and neutral approach may shift toward knowledge, thereby leading to management of the pandemic in a more effective manner. It was suggested that governments need to plan the psychological interventions in such a way that the citizens can productively utilize the period of isolation. [9] discussed that In surgical planning and cancer treatment, it is crucial to segment and measure a liver tumor's volume accurately. Because it would involve automation, standardisation, and the incorporation of complete volumetric information, accurate automatic liver tumor segmentation would substantially affect the processes for therapy planning and follow-up reporting. Based on the Hidden Markov random field, Automatic liver tumor detection in CT scans is possible using hidden Markov random fields (HMRF-EM).

Mirza Waseem Hussain et al 2020 [10] in his work aims to analyze and discuss the impact of covid-19 pandemic on the people and suggesting the appropriate remedies. Some important parameters taken under consideration where the impact of covid-19 on relationships, health, online education, lifestyle, income and screen time etc. In this study it is concluded that immediate effects and the unprecedented change in the world we live in due to the ongoing pandemic. The paper aims to highlight the immediate impact of the covid-19 on the behavioral change of the people and assessment of awareness in the general population about covid-19.

Imrus Salehina examined et al 2021 presented human mental behavior after passing through a long time home quarantine using machine learning. Machine learning algorithms used for this work are Naive Bayes classifiers, Support Vector Machine, and logistic regression. A new model RHMCD was proposed which helps to reach our required goal. By using this model the effects on mental change such as stress, depression, mood swing are studied after the home quarantine for a long time, people are going to notice. Decision tree approach is also used for measuring the level of depression. [11] discussed that The study of viruses and their genetics has been an opportunity as well as a challenge for the scientific community. The recent ongoing SARSCov2 (Severe Acute Respiratory Syndrome) pandemic proved the unpreparedness for these situations. Not only the countermeasures for the effect caused by virus need to be tackled but the mutation taking place in the very genome of the virus is needed to be kept in check frequently. One major way to find out more information about such pathogens is by extracting the genetic data of such viruses. Study explored by Jyoti Choudria et al 2021 [12] in two studies one how using the machine learning techniques to classify information and misinformation behavior of humans. Study 2 understands how humans, particularly older adults process the online in-fodemic regarding covid-19 prevention and cure. The study 1 has yet to be empirically verified in the context of covid-19. Classification accuracy achieved by decision tree classifier is 86.7% whereas by using Convolutional Neural Network model accuracy is 86.67%. The work represents an intersection of two very disparate paradigms one is machine learning techniques and interview data analyzed. Alaa H. Ahmed et al 2022 in this work spread of severe acute respiratory syndrome corona virus 2 among the people is studied. Infected people may experience body pain, headache, and sometimes difficulty in breathing. This can get

worse for older people. Particularly for those who have chronic diseases like diabetes, it may cause death because of the huge effect on some parts of the human body. For the severity of the disease depending on their chronic diseases machine learning algorithms are applied at an early stage to patients diagnosed with corona Virus. Besides, the paper demonstrates that in some cases, especially for older people, the virus can cause inevitable death.

Caspar J. Van Lissa et al 2022 [14] in this study covid-19 prevention behaviors were studied during the early phase of the pandemic; 56,072 participants from 28 countries were selected using machine learning algorithms. Predictions were studied in cross-national pattern. Attempt of this study is to predict the strongest covid-19 infection prevention behavior before vaccine. No psychological variable prediction outcome is studied. The results highlight how both data and theory-driven approaches can increase understanding of complex human behavior.

3. Prediction an arduous task for machine learning

Due to the covid-19 pandemic human behaviour becomes unpredictable and prediction using machine learning algorithms must always take into consideration the ever changing modules of human behaviour. For best prediction some feedback modules have also incorporated in the machine learning algorithms. Social networks [15] also play a crucial part in for analysing the human behaviour. Modules like social influence deep learning which combines method like CNN and deep CNN can be combined for better prediction.

3.1 Human behaviour in context with artificial intelligence

First we must understand the artificial intelligence in context to human behaviour. Humans are the most intelligent creators on this earth we know of. On the other hand artificial intelligence is the broad branch of computer science. The goal of artificial intelligence is to create system that can function intelligently and independently. Humans can speak or listen to communicate through language this is a field of speech recognition. Much of the speech recognition is statistical base hence it is called statistical learning. Humans can read or write text in a language this is a field of natural language processing. Humans can see with their eyes and process what they see this is a field of computer vision computer. Vision falls under the symbolic way of learning for computer process information. Humans recognise the scene around them through their eyes which create images of the world this field is image processing. Even though it is not directly related with artificial intelligence but required for computer vision. Humans can understand their environment around accordingly this is the field of robotics. Humans have the ability to recognise the patterns such as grouping of like patterns of objects this is a field of pattern recognition.

Machines are even better for pattern recognition and stress detection [16] because they can use more data and dimensions of data. For the detection of human behaviour machine learning use the network of neurons this can be replicated by structure of function of human brain. We may get conjugative capability in machines this is the field of neural networks. If the neural networks are more complex and deeper we use them for learning complex things that is the field of deep learning. There are different deep learning methods in the machine learning which use different techniques to replicate what the human brain does. If we get images to scan from left to right or top to bottom it is a convolutional neural network. Conventional neural network is used to recognise objects in a scene humans can remember the past. We can get a neural network to remember a limited part this is a recurrent neural network. So we can judge that the artificial intelligence work in two main ways as shown in figure 1 below. Symbolic based learning and the other is database learning. The database is called machine learning; we need to feed lots of data before it can learn. If machine learns the pattern then machine can predict the forecast based on that data. It can be one, two or three dimensions which is easy for humans to understand or learn. But machine can learn in many more dimensions that is why machines can look at large high dimensions of

data and determine the better. Once machine learns the predictions humans will not be able even to come close to; and these techniques can be used for classification and predictions.

3.2 Human behaviour and prediction crises

So there is a dearth of research to predict the human behaviour during pandemic. Several machine learning algorithm techniques were used for the prediction but due to the sudden spike of the covid-19. There was a sudden demand for some commodities which the machine learning algorithms failed to

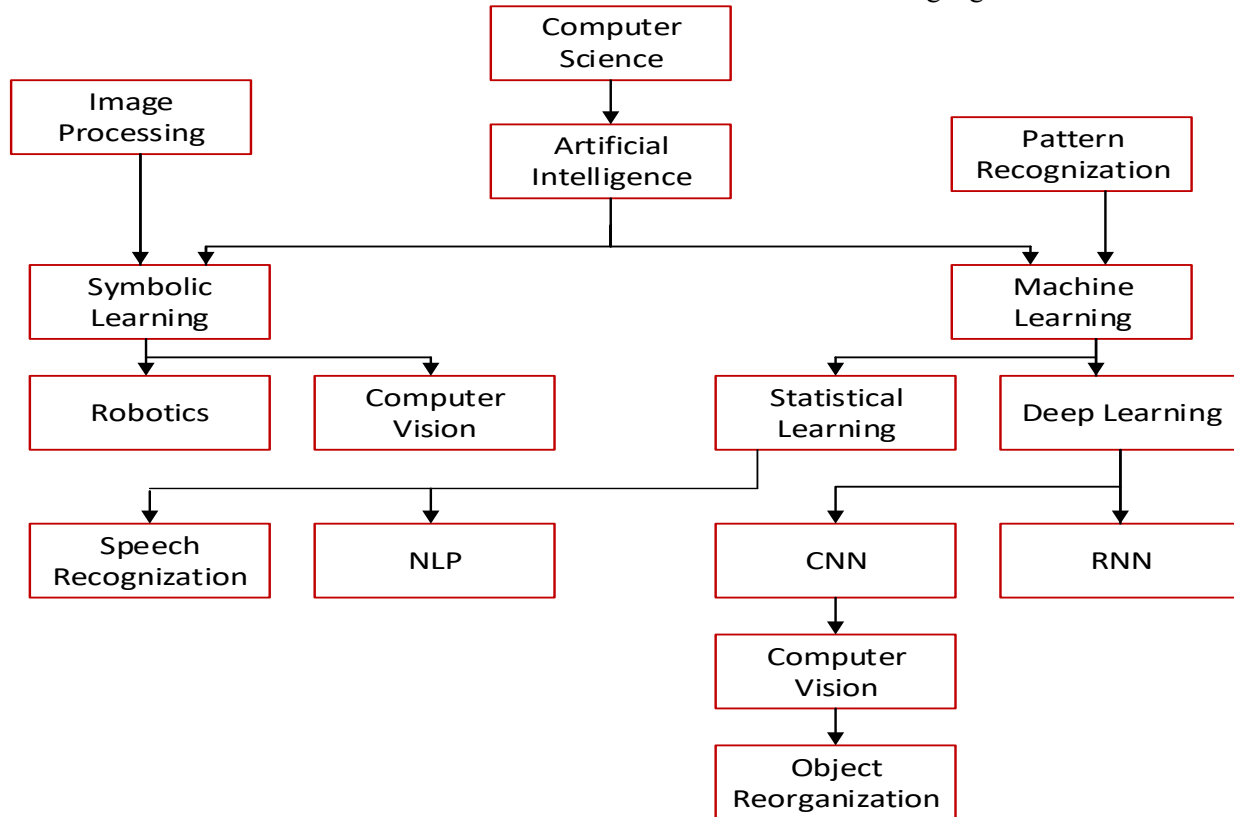


Fig.1 Artificial intelligence and its types.

detect at that time. The medical system was in tremendous challenge worldwide in so many aspects this include the sharp increase in hospital beds, medicines, critical medical instruments. Thus, the critical decision making for effective usage of the health care resources where at the most important. To make the immediate and effective decisions the computer technology like machine learning, artificial intelligence has to play a big role. Different machine learning models were proposed for the prediction so that the medical healthcare system can utilise the resources at most. Several methods are discussed in the literature survey with their performance. The demand prediction for the various goods, sale of goods pattern can be read on normal days and during the covid-19 pandemic. For example the goods sold by top multinational companies during the normal period and the goods sold in the covid-19. Item sold during the special occasions and normal days; the pattern can be read on a normal day but it was difficult it was not true in the case of covid-9 as the human behaviour changes drastically. [13] discussed about diabetic retinopathy from retinal pictures utilizing cooperation and information on state of the art sign dealing with and picture preparing. The Pre-Processing stage remedies the lopsided lighting in fundus pictures and furthermore kills the fight in the picture. Although the Disease Classifier step was used to identify arising wounds and other data, the Division stage divides the image into two distinct classes. The methodology

for ensuring red spots, exhausting and recognizing evidence of vein-lobby hybrid focuses was also developed in this work, using the hidden data, shape, size, object length to expansiveness distribution as contained in the general fundus picture in the problem area.

The buying behaviour of the customers was hit suddenly when covid-19 started. Rapid increase for items like face masks, collex wipers and N 95 masks etc. It started from Italy followed by Spain, France, Canada and the USA (Heaven Douglas 2020 [17]) they create the hassles for the machine learning algorithms and difficulty in inventory management, marketing fraud detection etc. The machine learning algorithms training on the normal demand has found it difficult to predict the change as it was sudden. So some machine learning algorithms were no longer working as they should be. Pandemic has made it clear that artificial intelligence and human behaviour are co-dependent means change in human behaviour need a change in artificial intelligence and change in artificial intelligence works change in our human behaviour. It is also evident that the key for automation system is the human environment, human interaction or brain. Most of the machine learning algorithms are fragile when exposed to the human behaviour situations when change drastically they perform badly. When input data differs too much from the data they were trained so it is a mistake to assume that artificial intelligence setup can predict any human behaviour situation at its own.

4. Conclusion and Future work

Machine learning and artificial intelligence are very good applications used for predicting the human behaviour and are involved in our daily routine. These applications are very helpful for surviving in this technical world which is rapidly evolving. High value predictions is the best part of the machine learning which enables humans to take better decisions and smart actions in the real world problems without human interventions. But on other side these applications lack the emotion content and are unable to predict the rapid human behaviour change which is the main focus of this paper

Due to the sudden change in the human behavior in context to covid-19 machine learning algorithms or artificial intelligence are not able to predict the things as per situations. Thus, in the pandemic all the machine learning software handling the inventory could not handle this type of situation because machine learning algorithms where trained for a certain pattern that can be read on a normal day. But it is not true in case of covid-19 situations where human behaviour changes rapidly. This is a new opportunity for all the researchers in this field or area that machine learning algorithms should be made dynamic so that they can easily detect or predict the rapid human behaviour change.

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