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Artificial Intelligence and Machine Learning- The New Emerging Technology

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Abstract:
With the emergence of new requirements & needs and ways to resolve these needs, nowadays software development has become the most demanding and powerful way to solve and satisfy the requirement of the customer and end user. Any requirement raised by the set of people from different domains and age groups, there are multiple ways to solve the purpose but nowadays software development has become the most powerful approach to solve the purpose. Additionally, software implementation has become the most effective way to satisfy the customer requirement. Basically, software development is a defined and structured method that starts with a set of requirements or some problem statement. Once the requirement is finalized then in the next phase the approach is defined to solve the requirement which is followed by code development considering the fact that it is the most suitable approach to solve the purpose. Also, this software had the capacity to solve or change the traditional mechanism of working. For example, around 10-15 years back, the BFSI sector was working with the help of pen and paper. All records were kept on some paper or registered with lots of problem statements like maintenance of documents, extra delay in processing, and flexibility of using own account money at some other location. Additionally, these bankers were not able to do any analysis or tend analysis for the available set of data which was available with the available data set. In addition to trend analysis, these people were not able to do the projection analysis finally resulting in the loss of business opportunity which was possible with the help of trend analysis. Implementation of software that could automate the activity was able to solve the initial problem statement with the help of projection and trend analysis attracting the business opportunity. The people were able to maintain track of each customer and region accordingly. Also, timely action on these data and corrective action was possible. Still, the missing part was the processing of a large dataset and extracting meaningful information from the available dataset. Also, they were not able to do a trend analysis for the market. In order to resolve the above-said problem statement Artificial Intelligence was introduced which is also known as AI which has the capacity to process larger datasets and is able to extract information that is accurate and correct in nature. Additionally, with the help of AI, the researchers were able to do the sentiment analysis of the market through which they were able to do the corrective action as per the requirement. Additionally, AI help in fraud detection, compliance enforcement, and other help in the most cost-effective manner and in very less time.

Keywords: Artificial intelligence, AI, Emerging Technology, Revolutionary Technology, Agile development, Machine learning

I. Introduction

The transaction from manual computation to automated computation with the help of computers was a major breakthrough when we talk about technical transition. This transition had the capability of saving cost and effort with an accuracy of data [1] [2]. The implementation of machine learning has been for many years. But in recent years, the implementation of AI&ML happening a lot because of technological enhancement and a boom in the area of Big data in all sectors like BFSI, healthcare, retail, etc [3]. The aim of the current paper is to showcase the capability of AI&ML along with practical implementation [4]. The implementation of AI&ML takes place with the help of an algorithm where the algorithm written is first trained with the training data and later executed with the testing data having the goal of having perfect prediction and drawing decisions out of the prediction. AI & ML typically use statistical methods for learning purposes from the available set of data [5] [6].

In recent years, machine learning has given a lot of technical and functional boost to artificial intelligence. AI has become very popular only because of its huge capacity like the capability of processing very large datasets, doing the prediction analysis along with deep understanding of the available dataset which was either not possible earlier or very difficult to get [7] [8]. Nowadays, for example, social media data, which is growing like anything day by day along with the complexity of data, a machine with high computing capacity is required which is quite normal and evident these days for big data items [9] [10]. AI has the capacity of processing big data at higher speed and on low configuration is the major reason for the implementation and wide usage of AI&ML [11].

The AI&ML because of its simplicity and capability of growth in different directions, has made it possible to implement in various fields such as banking and finance, the healthcare sector, insurance, and so on. With the help of AI, which has the capability to do the processing at a very fast speed on very large data and get accurate results, it is quite fitted for image processing in the medical sector, NLP, and speech recognition [12]. It helps a lot in taking correct decisions and helps in creating real-time solutions for complex problem statements and associated data items.

Technology is changing day by day and each day we come across a new tool or technology which is capable of showing the flip slide of existing tools and technology. Artificial intelligence is one such area in the field of computer science where the existing concept changes with the implementation of intelligent machines [13]. We see a lot of implementation of Artificial intelligence all around us now a day in all aspects of life like the creation of robots which is helpful not only in medical surgery but in support of household tasks, auto-driven cars to auto-driven aircraft, projection analysis in the healthcare sector to the projection analysis in the banking sector with the processing of large dataset, doing sentiment analysis for the online social media network to the identification of influential nodes in the large online social media network like Facebook or Twitter. The above examples can be concluded in the way that computer science and engineering along with the implementation of Artificial intelligence has become an integral part of life in the current era which says the work done by human beings can be and will be done with the help of trained and intelligent machine. So Artificial intelligence can be stated as the refined branch of computer science where intelligent machines can be trained to perform all the tasks which can be performed by a normal human being including brain thinking. Machine learning is considered as the extension of Artificial intelligence with the intention of training a machine or algorithm which can act like a human brain with having capabilities of taking the right decision keeping in mind the different permutations and combinations with the help of available datasets [14].

The AI&ML helps us in solving the real-world problem statement with the help of correct algorithm development and followed by experimental analysis done on the available dataset finally helping in taking the correct decision.

The AI&ML is implemented in all aspects of life starting with sentiment analysis to stock exchange data processing. Healthcare data processing to baking sector prediction analysis.

Over the years, the world has witnessed phenomenal growth in economy aided by growth in technology. As the world evolved, nations have also witnessed changes in their demographics like life expectancy, the age of their population, and how nations have reacted to these changes in terms of health index, public health spending, etc [15].

Since all the technological enhancements are good for the human being and for the betterment of humans and current society the next question is why Artificial intelligence was accepted by human society so easily.

AI & ML: Advantages

It is because of the following reasons

- ✓ Software development was the key factor behind the implementation of Artificial intelligence.
- ✓ Implementation of software was already happening and the availability of trained resources helped a lot.
- ✓ Variety and diversity of implementation in all aspects of life from aircraft to robot designing helping in medical science
- ✓ In the banking sector for transactional banking to core banking
- ✓ Developing and designing house help assistant
- ✓ Solving very critical problem statements

The main purpose of the implementation of artificial intelligence was

- ✓ Getting ease of life through replication of human intelligence
- ✓ Designing a system that was capable of giving advice and acting like a normal human being.
- ✓ Develop a system that was capable of solving the issues which demand human-like knowledge
- ✓ Capability of developing an application that was possible to process very inconsistent and large datasets providing an accurate and correct dataset.

As part of this evolution, not every country has had the same level of growth. They have varied both in terms of their economic indices like GDP (Gross Domestic Product), etc., and also in terms of various demographic parameters such as Life Expectancy at birth. Life expectancy at birth is a measure of a population's health. Understanding and assessment of Life Expectancy at birth is important as it provides a snapshot of the quality of life of the given population [16].

Countries across the world are so interconnected now that any change in one country in terms of economic decisions, health, or geo-political conditions can have an adverse impact on other countries as well or could even bring the world economy to a grinding halt.

Objectives of the Paper:

The objective of this paper is to see the impact of factors like political conditions, diseases, GDP, and healthcare expenditure on world Life Expectancy at birth using statistical models and machine learning techniques. The aim of this paper is also to collate and scrutinize the datasets to obtain the expected results. Ultimately, the aim of these efforts is to perform descriptive, predictive, and prescriptive analysis using the datasets to see what the past trends show and what's the current situation and what we can do to improve life expectancy at birth [17].

Scope of work and out of scope:

The scope of the project is limited to data available in the public domain (https://ourworldindata.org/) and data which are published by various government agencies like the World Bank, WHO, etc with the implementation of Artificial intelligence and machine learning.

Data References:

For the experimental analysis, the data was picked from an opensource available dataset as below

1. https://ourworldindata.org/
2. https://databank.worldbank.org/
3. https://apps.who.int/

Experimental process:

The project will include the following steps;

1. Extract the data available in the public domain.
2. Tune the data which is suitable for the experimental analysis.
3. Identification of correlation between different factors.
4. Write the AI&ML code for the prediction of the impact on the world life expectancy due to the various factors including geo-political conditions, diseases, GDP, and health care spending.
5. Visualization of the historic data and the predictions.

Tools usage for the experimental analysis:

Following is the list of tools used for the experimental analysis.

1. R notebook / Python,
2. Microsoft Excel,
3. Tableau, or Power BI for further data visualizations.

Method of evaluation:

The methods used for the experimental analysis were

a) Time series analysis
b) Regression analysis

Experimental result:

The experiment was performed on the data available in the public domain using RStudio. The whole dataset was divided into two parts ie training data and testing data.

Existing data have indicated that economic as well as geopolitical parameters influence demographic parameters such as life expectancy. Hence, it is important to understand these data points in detail and their relationship between them for the assessment of Life Expectancy at birth. Fig[1] below plot says the life expectancy increases in the developed country is higher than the developing country along with the increase of life expectancy with the increase in expenditure.

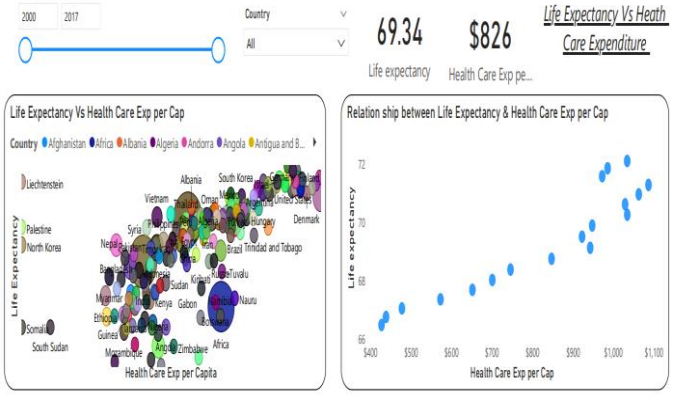

Fig 1: Life Expectancy Vs Health care expenditure

The fig1 shows the life expectancy vs healthcare per capita and their relationship. The first plot gives a clear picture that the country which is expending less on healthcare has less life expectancy and the countries that spend high on healthcare are having high life expectancy. The countries like Guinea, Myanmar, and Sudan are expending less on healthcare and hence have less life expectancy whereas the countries like Denmark, the US, and Germany are expending more on healthcare infrastructure are having high life expectancy. From plot 2 of Fig 1, the graph clearly shows as we increase the expenditure on healthcare infrastructure, life expectancy increases.

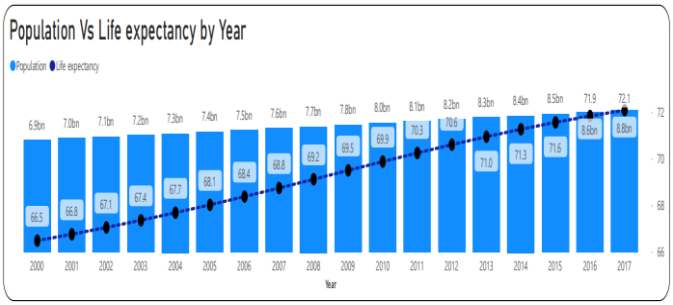

Fig 2: Population vs Life expectancy by a year

The fig2 says, as the population across the globe increases, life expectancy increases. During the year 2000, the population of the globe was minimum and the healthcare expendeture was also minimum where as during the year 2017, the population was highest and correspondingly by the time the life expetancy also increased.

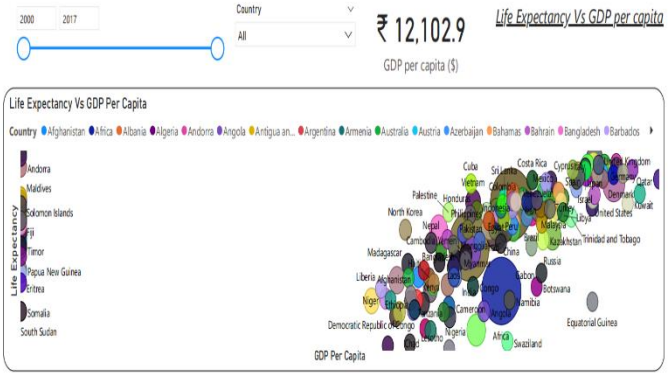

Fig 3 : Life Expectancy vs GDP per capita

GDP per capita is the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population. Growth is calculated from constant price GDP data in local currency. From fig 3, it is clear that as the GDP increases, the life expectancy also increases. GDP is directly associated with the population of the country. Again the countries which are developed like Denmark, US and Germany have higher life expectancy whereas the countries like Liberia, Sudan and Nigeria having low GDP have low life expectancy.

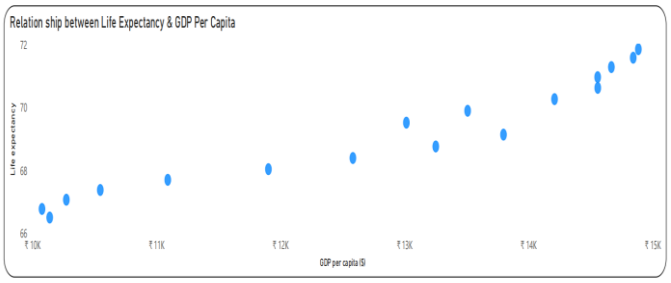

Figure 4: Relationship between Life Expectancy and GDP per capita

The fig4 says, as the GDP across the globe in cases, life expectancy increases. We can see the increasing trend in life expectancy as the GDP increases. For lower GDP the life expectancy was less whereas for higher GDP the life expectancy was higher.

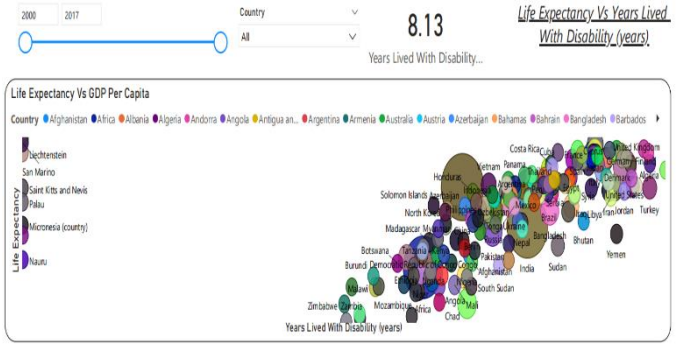

Fig 5: Life Expectancy Vs Years Lived

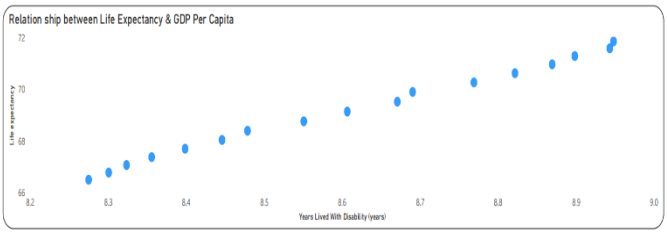

Fig 6: Relationship between Life expectancy and GDP per capita

Fig 5 and Fig 6 state the relationship between life expectancy Vs years lived with disability. The plot for this is in the same lines as expenses in healthcare and GDP. The higher the value of the year lived the higher is the life expectancy.

Experimental code:

The experimental analysis was done through the code written in R-Studio and the plotting of the data was done through the tableau and the code can be provided as per requirements of the publication.

Summary and Conclusion:

Hence, from the experimental analysis, we can conclude that the AI&ML is the most emerging technology nowadays with a lot of advantages. Nowadays AI & ML has become an integral part of life and is able to solve all types of problem statements with a diversity of implementation. Wide acceptability and implementation is because of flexibility and easiness. AI&ML is implemented in all domains currently available from Banking to the healthcare sector. The current experimental analysis proves that the very large dataset can be processed with the help of AI&ML and a very effective conclusion is drawn from the experimental analysis. The life expectancy can be drawn along with different factors like population or GDP. Additionally, the future planning is possible with the help of the information available through different plots and stats available.

Future scope of activity:

Since the implementation of AI & ML is spread across all domains, more effective prediction analysis can be done particularly in the healthcare sectors. Additionally, tools like Tableau can help a lot in proper data representation. Support for unstructured data can be done as future scope of activity for AI & ML.

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