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Role of Artificial Intelligence in the field of medical and healthcare: A Systematic review

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Abstract

Due to its usability to make any system smart, efficient and cos effective Artificial Intelligence (AI) can be applied in every sphere of our lives. Whether it is business, sales, marketing, or even healthcare and medical related field. The impact of AI [1]in the field of healthcare and medical is absolutely life changing. Good results of AI application in this field make the development and innovation more enthusiastic and therefore public and private sector investment in healthcare encompassing areas such as healthcare, clinical research, drug development and insurance. Another challenge is the availability of expert doctors and medical staff along with availability of pharmacy store nearby. AI will definitely prove useful in simplifying clinical decision in various medical field especially in the area of radiology. The cognitive functions of the human can me imitated through the application of AI in this field through working on structured (e.g. image, genetic and electrophysiological data, etc.) and unstructured data (e.g. clinical notes and medical journals and also analytical techniques) to reach the sustainable inference through machine learning [2], [3]and natural language processing (NLP), respectively. This paper is explaining the review of this field along with analysis of the literature available in the SCOPUS database.

Keywords: Artificial Intelligence, AI medical research, Bibliometric analysis, Machine learning and Deep learning,

INTRODUCTION

The general perception of the world “artificial intelligence" (AI),[4]–[6] is the working with robots and machine which are used to doing our jobs because the ability to make decision[7]. This functionality is the core of the acceptability of the AI in various fields and medical and healthcare is one of them.

The outcome of the AI in this field has been addresses by Professor David B. Agus, MD at the University of Southern California Keck School of Medicine and Viterbi School of Engineering, is separation of facts from science fictions.

AI applications in the field of medical and healthcare can be addressed as per the following points as:-

- Robotics for operations and surgery
- AI in health care mainly refers to doctors and hospitals accessing vast data sets of potentially life-saving information.

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- Treatment methods and their outcomes, survival rates, and speed of care gathered across millions of patients, geographical locations, and innumerable and sometimes interconnected health conditions.
- New computing power can detect and analyze large and small trends from the data and even make predictions through machine learning[8]–[11] that's designed to identify potential health outcomes.
- Machine learning uses statistical techniques to give computer systems the ability to "learn" with incoming data and to identify patterns and make decisions with minimal human direction.

Artificial Intelligence renovates:

- Global productivity
- Lifestyles
- Healthcare Technologies
- Patient care
- Healthcare admin processes

CHALLENGES Faced by Healthcare Due to AI

- Divide Data for Different Purposes
- Eliminate Duplicated and Errors with Reviewing
- Pre-Trained AI Model Application

AI is Transforming Healthcare

- Specialists Utilizes AI for Quicker Diagnosis
- Pharma Firms Quickens Development using AI
- AI Automates Claims Administration in Health Insurance
- AI Make Healthcare Business

AI Adoption can build Trust and Education

There are countless health-related issues that experts can argue on. The hottest one nowadays is realizing the vitality of aligning financial incentives through APMs (Alternative Payment Models).The second one is to find relevant solutions for solving data interoperability hitches across the diverse health system, which are somehow restraining the overall progress of the healthcare industry.

- Alternative Payment Models or APMs
- Interoperability

Examples of AI Applications in Healthcare

- Drug Discovery through AI Techniques
- Robots for Surgeries
- Actionable Insights
- Eye Surgery Conducted by Robot
- Virtual Nursing Assistants
- AI Supports Admin Tasks
- AI Image Analysis Helps Healthcare Professionals

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Available Document per Year

Major contribution related to the research in the field of Role of AI in medical and healthcare, it'sComponents, implementation and efficiency and other related task is reported from 1997. But since 2002, good amount of the research articles have been reported in literature. The details of the documents available in literature is shown in Table-1

Table-1 Year wise details of the available literature

Year	Documents
2020	177
2019	111
2018	61
2017	33
2016	25
2015	23
2014	22
2013	28
2012	20
2011	12
2010	16
2009	21
2008	15
2007	10
2006	19
2005	15
2004	5
2003	3
2002	3
2001	3
2000	2
1999	5
1998	1
1997	6
1996	2

The analysis of the available document with respect to year has been illustrated in Figure-2.

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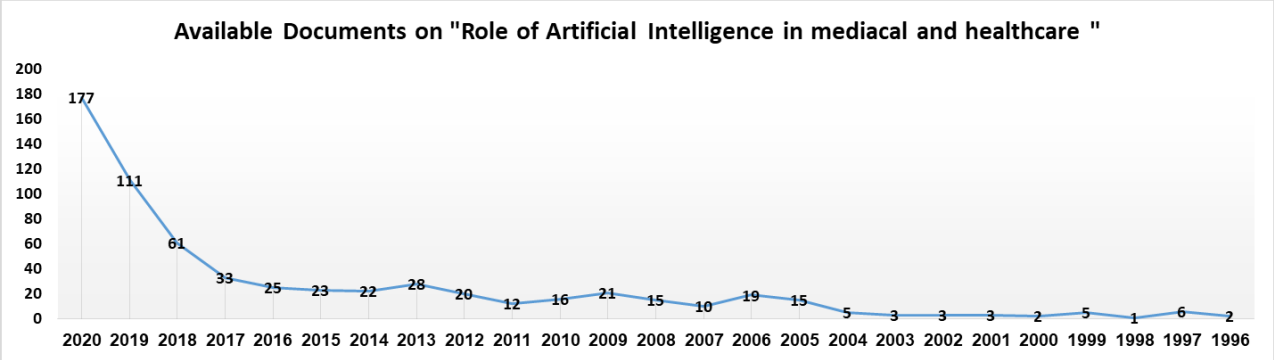

Figure 1 Graph about the documents available year wise

Major Contributor in the research field "Smart Grid"

It has been observed that United States took lead in the field of Smart Grid. Top contributor universities are from United States which are list in the Table-2. Therefore United States has been done research in software-bug and its related various field to manage the things securely and transparently. It is important for all the business working on Information and Communication Technology like health sector, manufacturing[1], [12]–[14], sales, etc.

Table-2 Affiliation wise details of the available literature

Affiliation	Documents
University of Toronto	14
Harvard Medical School	10
Massachusetts General Hospital	8
Stanford University	7
University of Texas MD Anderson Cancer Center	7
National University of Singapore	7
UniversitàdegliStudi di Milano	7
Amsterdam UMC - University of Amsterdam	6
University of Montreal	6
Saint Michael's Hospital University of Toronto	6

The results are also be analyzed through the bar chart as shown in the figure-2.

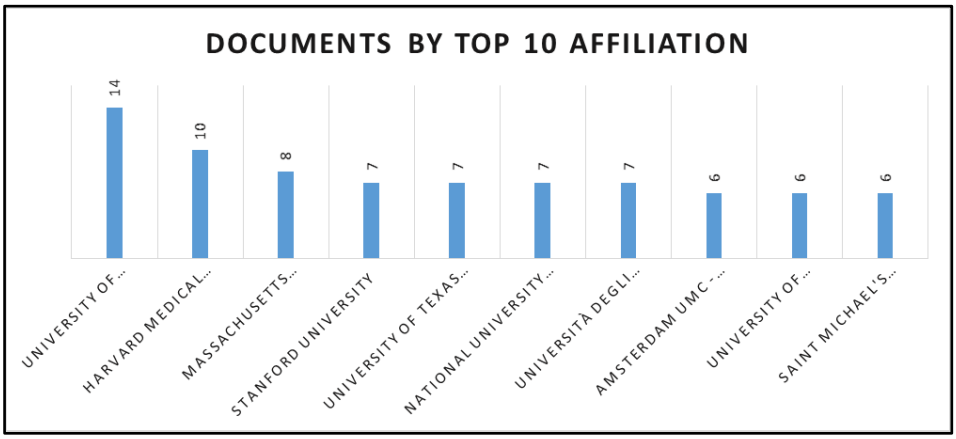

Figure 2 Statistical representation about the documents with respect to affiliation

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Top Countries working in the research field "Smart-Grid"

While analyzing the available literature in the field of Smart Grid, it has been overserved that, top 10 countries are United States, India, Spain, Italy, France, United Kingdom, Germany, South Korea, China, Japan and so on. The documents numbers as per SCOPUS are analytically represented in Table-3.

Table-3 Country wise details of the available literature

Country/Territory	Documents
United States	204
China	62
India	61
United Kingdom	58
Italy	47
Germany	39
Canada	38
France	22
Australia	21
Netherlands	20

The statistical representation of the data is illustrated in Figure-3 , where the longest bar is of United States and shortest is of Netherlands.

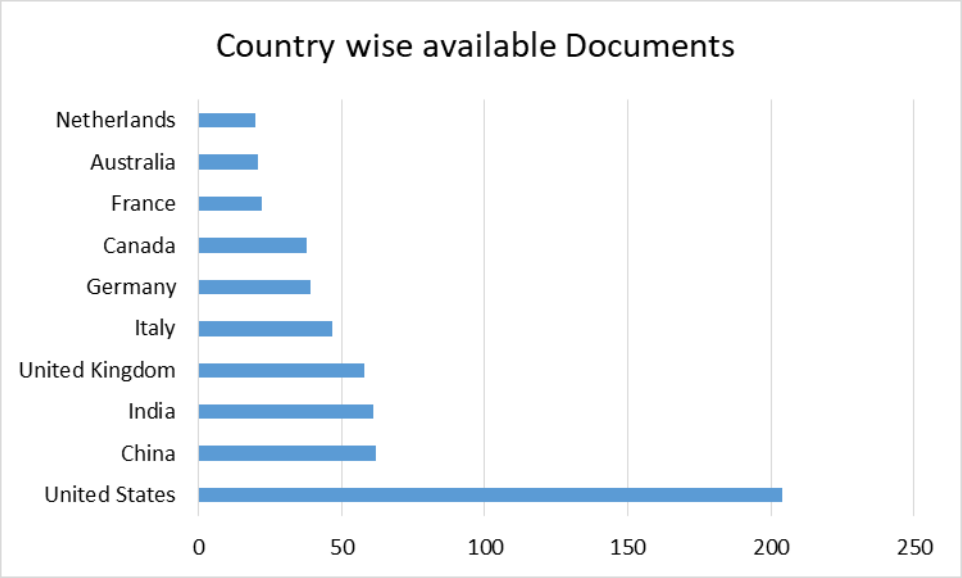

Figure3 : Graphical analysis of available literature documents in the field of **Smart-Grid**

Domain Areas related to "Role of AI in medical and healthcare"

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The **Role of AI in medical and healthcare**can be implanted in various software related field and applications of various domains. As per available literature documents, the following fields/Domains have been extracted as-

- Medicine
- Computer Science
- Engineering
- Biochemistry, Genetics and Molecular Biology
- Social Sciences
- Mathematics
- Neuroscience
- Pharmacology, Toxicology and Pharmaceutics
- Health Professions
- Nursing
- Decision Sciences
- Psychology
- Arts and Humanities
- Physics and Astronomy
- Immunology and Microbiology
- Materials Science[15]–[17]
- Agricultural and Biological Sciences
- Business, Management and Accounting
- Chemical Engineering
- Energy
- Dentistry
- Environmental Science
- Chemistry
- Multidisciplinary
- Economics, Econometrics and Finance
- Earth and Planetary Sciences
- Veterinary

The share of the documents of these field is illustrated using the pie chart in Figure –4for understanding so that the researcher will be able to identify the potential area to further research.

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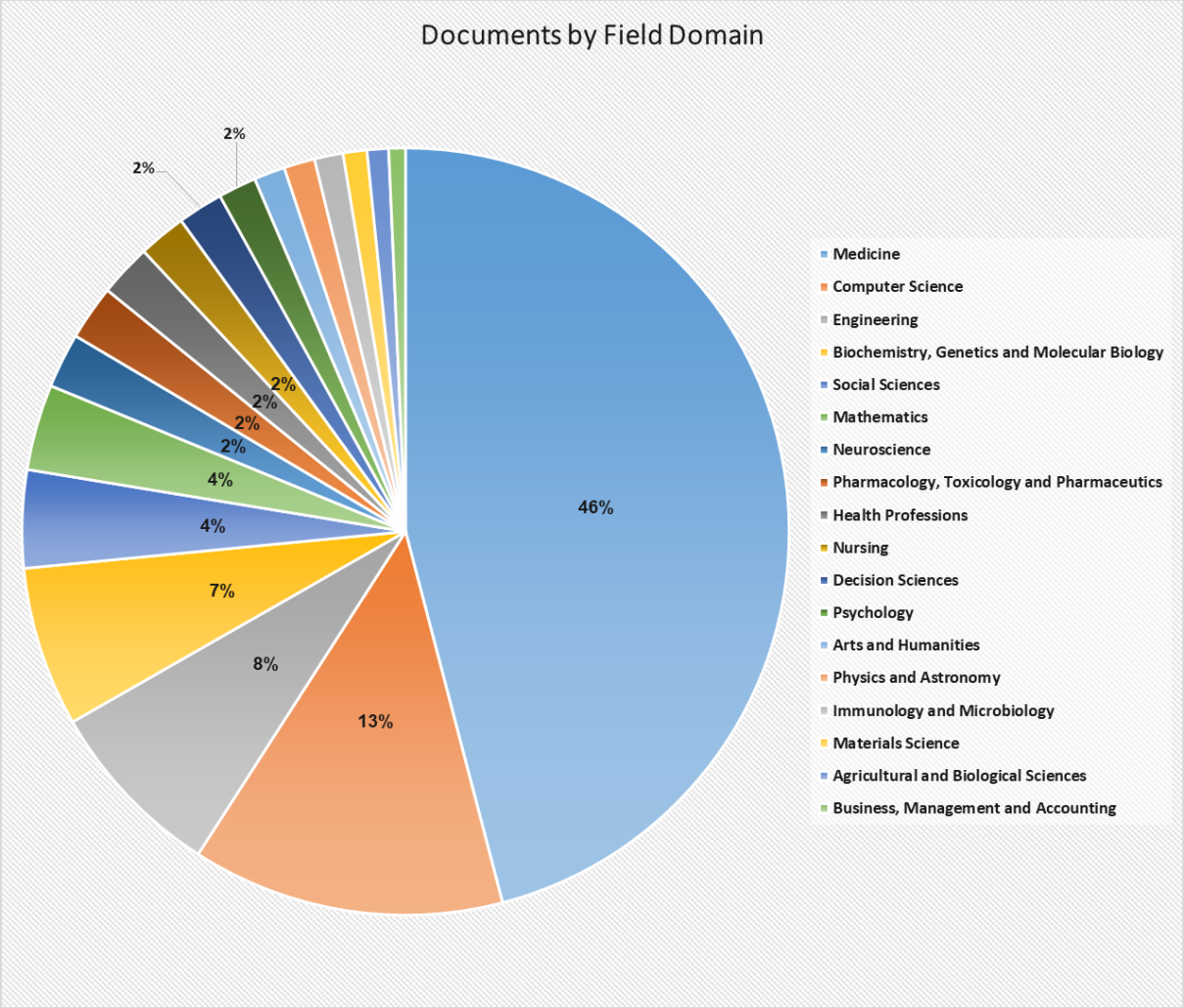

Figure :4 Graphical analysis of available literature documents in the field of **Smart Grid**

CONCLUSION

Artificial Intelligence and Machine Learning are the two tech components that are continuously transforming various industries particularly the healthcare [18], [19]sector. Considering the uncountable benefits AI can bring to the sector, many leading brands and companies are investing in bringing out innovations using AI. According to the CB insights report of 2016, by the year 2020, companies are going to spend around $54 million on AI-projects. AI uses pattern recognition that helps in analyzing the patients at risk or prone to getting caught with any severe infection or disease. With the help of AI,it's easy to align the big health data and to spend less time in taking better decisions that ensure progressive outcomes. Drug research is one of the most crucial problems faced in the medical sector. According to the research, out of 5000, only five drugs made it to the human testing from the preclinical testing. Moreover, it will charge millions of dollars for companies to clinically test each one of their drugs. However, with the involvement of AI it has become simpler to streamline drug testing and evaluation. The process has become efficient along with having cost effective techniques. This paper illustrated and explaining the various components, applications and statistics about the available research documents in the field of AI role in

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medical and healthcare. This is very important field where a lot of wor will be conducted for welface of society.

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