



ROLE OF **AI** IN **HEALTHCARE**

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Organization profile

Strategy &
Research



Digital Health



Modelling &
Forecasting



Real World
Evidence



Medical Writing



Artificial
Intelligence



Business
Intelligence &
Reporting

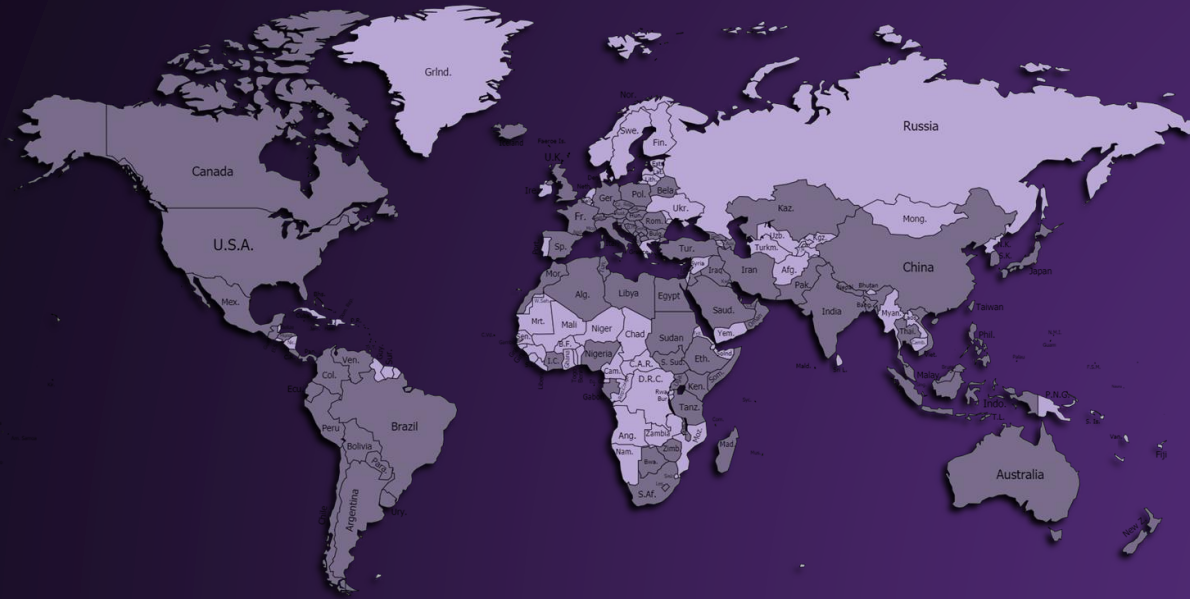


Claims Analytics



KOL Identification
& Mapping

— Organization profile



CLIENTS



— Literature Review

S.No	Author	Year	Objectives	Conclusion
1	Bertalan Mesko	2017	To determine the role of AI in precision medicine	AI has serious ethical considerations and legal issues despite which It can realise its potential through implementation of precision medicine to personalise treatments if and only if it proves to be safe and is implemented with proper guidelines.
2	Bertalan Mesko, Gergely Hetényi, Zsuzsanna Györfly	2018	To determine the implications of AI on Healthcare human resources	AI will help with improving quality of care. AI will not solve Healthcare HR crisis immediately. AI will make people prefer hiring AI skilled individuals over those who are not.
3	Michael Lupton	2018	To understand the ethical and legal consequences of application of AI in healthcare	The legal systems will be prone to liability for their decisions regarding patient treatment with AI, in the same way as doctors who treat their patients are liable. Safe use of AI is encouraged, supported by regulation systems encompassing all aspects of medical malpractice, products liability and vicarious liability.
4	Thomas Davenport, Ravi Kalakota	2019	To assess the potential for artificial intelligence in healthcare	Using AI for diagnosis and treatment is challenging. AI can be used to examine radiology and pathology images. AI will not replace human clinicians.
5	Zeeshan Ahmed, Khalid Mohamed, Saman Zeeshan, XinQi Dong	2020	To analyse and discuss various published artificial intelligence and machine learning solutions for implementation in healthcare	AI and ML can play a vital role in health intelligence, precision medicine and resource management.

— Study Framework

Research Question

What is the role of Artificial Intelligence in Healthcare services?

Objectives

- To explore the areas of application of Artificial Intelligence in healthcare services around the world
- To identify if the extent of application of AI in healthcare services differs between developed countries and developing countries

Methodology

Key words for searching: AI in healthcare, Artificial Intelligence in healthcare, Machine learning in healthcare, Medical AI etc.

Data Collection



Journals/ Articles Collection

IIHMR- RemoteXS
Online journal and student
paper search across various
platforms- Science direct,
PubMed



Statista

Relevant data pertaining to AI
in Healthcare markets across
various nations, Healthcare
deals worldwide, Top 10 AI
startups in Healthcare etc.



Company offerings

Data from the official websites
of KenSci, Pathway Genomics,
Lumiata, Microsoft, DeepMind,
IBM Watson etc.

AI IN HEALTHCARE

A Discussion



— What is Artificial Intelligence?

Artificial Intelligence is defined as the capability of a computer program to perform tasks or reasoning processes that is associated with intelligence in a human being.

Machine Learning

- Supervised ML
- Unsupervised ML
- Reinforcement ML

Robotics

- Soft robotics
- Touch robotics
- Swarm robotics
- Serpentine robotics
- Humanoid robots

Artificial Neural Networks

- Deep Learning
- Convolutional Neural Networks
- Recurrent Neural Networks

Natural Language Processing

- Statistical NLP
- Semantic NLP

— Areas of Application



Preventive
medicine



Personalized
medical advice



Early and
accurate
diagnosis



Augmented
intelligence



AI Robots



Medical
Information
Management



Precision
medicine



Drug
discovery



Administration



Public
Health



Patient
engagement &
adherence

— Preventive Medicine



Genetic testing lab which is developing an AI-powered application to provide customized preventive health advice based on a user's genetic makeup.

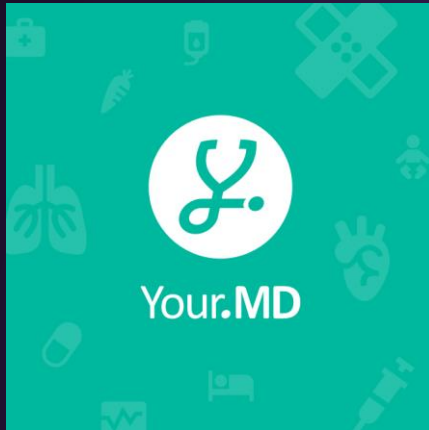


A partnership to develop an AI-powered 'cognitive coaching system' which processes data from over 200 million people to develop personalized advice on sleep, fitness, and nutrition.



Washington-based start-up which is using AI to track the onset and progress of a disease, along with predicting chronic and critical illnesses within a group of patients.

— Personalized medical advice



Norwegian company that has developed an AI-powered mobile app that matches a patient's symptoms to publicly available data collected from various sources and offers them personalized advice regarding their ailments.

Creation of a new healthcare market segment called 'pre-primary care'.

Acts as a driver for large-scale behavioural change.

— Early and accurate diagnosis



An AI system that interprets online search engine behaviour and takes necessary pre-emptive measures.



The supercomputer analyzes large volumes of data to detect early signs of cancer or vascular diseases.



A team-up with NHS, UK to recognize vision-threatening conditions by conducting a digital scan of the eye.



Machine learning algorithm to detect PTSD by listening to an individual's speech pattern with a 77% success rate



PATHWAY
GENOMICS®

Simple blood test to predict certain cancers by tracking minute levels of cancerous cells that have been cast off from tumors into the bloodstream.



Machine learning to identify patients who need early hospitalization or medication plans.



UNIVERSIDAD
DE MÁLAGA



AI technique to detect Alzheimer's by revealing brain patterns associated with the disease.

Augmented Intelligence and Medical Information Management

- Support clinicians with less training in performing tasks currently relegated to specialists.
- Filters noncomplex cases so that specialists can focus on the challenging case load.
- Takes up tasks that cause fatigue, inattention in humans.

- Supports with storage and retrieval of clinical documentation.
- Uses voice recognition for the purpose of patient clinical documentation.
- AI customized alerts- No 'alert fatigue' – increased specificity of alerts.

AI Robots

- Direct
- Indirect
- Home healthcare



Surgical Assistance



Recovery &
Rehabilitation



Research

INTUITIVE
SURGICAL®



Robot-assisted
sensory motor
therapy

A robotic system
that is similar to
human biology in
order to simulate its
workings in an
artificial setting

— Precision Medicine



Data from 22 million veterans collected over 20 years to determine how each gene variant in the genome affects phenotype.



To sequence at least one million genomes and use DNA-related information to treat cancer and heart diseases.



Applies GPU-based deep learning to determine how strongly genetic variants affect RNA splicing, a contributing factor for many diseases.

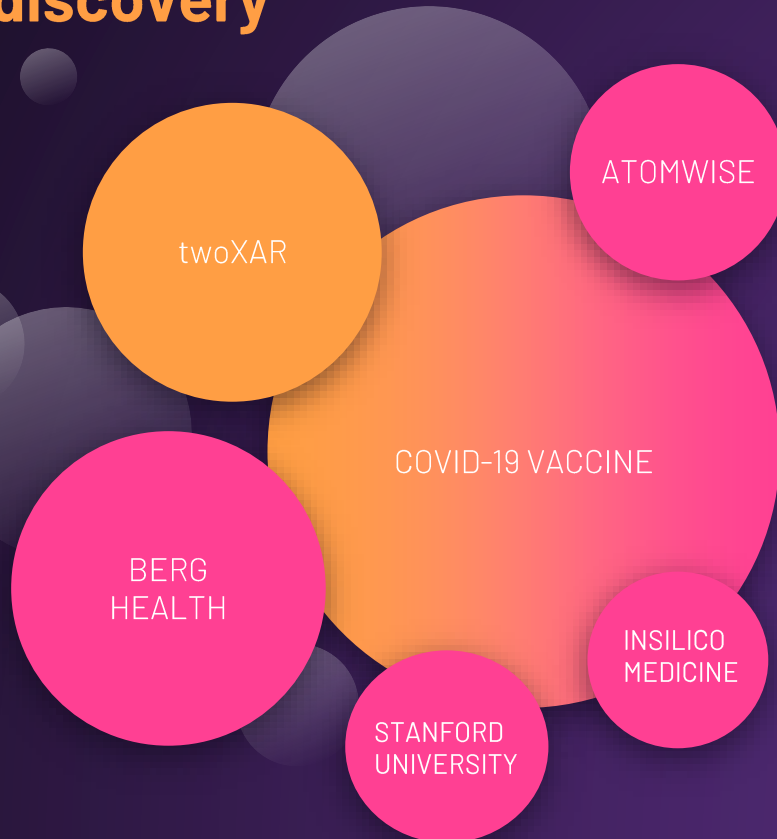


GPU-powered genetic interpretation engine that could identify cancer-causing mutations for individual patients.



Gene editing using a technology called CRISPR/Cas9

— Drug discovery



According to a study conducted by the Tufts Center for the Study of Drug Development (CSDD), the average cost of developing a drug that gains market approval is US\$2.6 billion, and the process takes more than 10 years.

— Administration



Prior authorization



Adjudication



Automated coding



Fraud claims



Provider directory
management



Patient scheduling



Chart abstraction

— Public Health and Patient adherence

Identifying specific demographics or geographical locations where the prevalence of disease or high-risk behaviours exist- Environment and obesity, Hospital revisits and paediatric asthma patients, Opioid use in Indiana

Designing the 'choice architecture' to nudge patient behaviour in a more anticipatory way based on real-world evidence- Data from EHR systems, biosensors, watches, smartphones etc.

— Developed Vs Developing Countries

High-income countries

- NHSX by the UK government
- MDR and IVDR by the European Union
- Google DeepMind's partnership with
 - Radiology, UCLH, NHS foundation trust
 - Moorfield's Eye hospital, UK
- Microsoft's AI to perform varied range of tasks
 - Analyze tumors and design new drug regimes
 - Track cancer progress in patients
 - Create programmable biological cells
 - Develop 3D views of tumors with InnerEye
 - Personalized care with Project Hanover
 - Chatbots for prescreening symptoms
 - Integrate Microsoft's AI research with other users to decrease manual data entry operations

Middle and Low-income countries

- 'Digital India' initiative by the Indian government
- India's NiTi Aayog's 'AI for All'
- HR planning among Community Health Workers in Africa
- Ubenwa's diagnostic tool for birth asphyxia
- AI based Diabetic Retinopathy diagnosis in Zambia
- CAD4TB software by Delft Institute to diagnose Pulmonary TB

— Conclusion

AI in health care is poised to make transformative and disruptive advances in health care. The wisest guidance for AI is to start with real problems in health care, explore the best solutions by engaging relevant stakeholders, frontline users, patients and their families—including AI and non-AI options—and implement and scale the ones that meet our Quintuple Aim: **better health, improved care experience, clinician well-being, lower cost, and health equity** throughout.

Despite the increasing attention on AI in healthcare in the developed countries, its introduction remains slower than expected. Innovation in developing countries, despite variations within and across national boundaries, faces realities and challenges in terms of infrastructure and capital that differ from those established in developed countries. However, there is tremendous promise in the possibilities that AI offers in transforming and improving healthcare in low-resource, developing countries.

A major lesson from the experience of AI professionals working in resource-poor settings is that AI implementation should focus on building intelligence into existing systems and institutions rather than attempting to start from scratch or hoping to replace existing systems.

— References

- AIP Conference Proceedings 1933, 040009 (2018); <https://doi.org/10.1063/1.5023979> Published Online: 13 February 2018
- Kuziemy, C. (2019, April 25). Role of Artificial Intelligence within the Telehealth Domain. Official 2019 Yearbook Contribution by the members of IMIA Telehealth Working Group.
- Jiang F, Jiang Y, Zhi H,et al. Artificial intelligence in healthcare: past, present and future. Stroke and Vascular Neurology 2017;2: e000101. doi:10.1136/svn-2017-000101
- Reddy, S. (2018, November 25). Artificial intelligence-enabled healthcare delivery. Journal of the Royal Society of Medicine.
- Bhattacharya, S. (2019, November). Artificial Intelligence enabled healthcare: A hype, hope or harm. Journal of Family Medicine and Primary Care.
- Wisetsri, W. (2021, March). Rise of Artificial Intelligence in Healthcare Startups in India. Researchgate.