

Use of Artificial Intelligence for Affordable and Accessible Healthcare in India

Artificial intelligence (AI) has potential to mimic human cognitive functions, thus, can be utilized in bringing a paradigm shift to healthcare, availability of healthcare data and rapid progress of analytical techniques. The AI is used to analyze huge structured and unstructured data and often perform repetitive tasks. Amalgamation of AI with machine learning, deep learning, and natural language processing helps us to deal with the challenges of scalability and high dimensionality of data. It also helps in developing a better understanding of genomics and find patterns in the data that makes sense. The AI has helped in transforming big data into clinically workable knowledge expansion. Recent advances in AI have the potential to accelerate the access, affordability and quality of healthcare in India.



Creation of artificial intelligence for affordable and accessible healthcare in India

Department of Biotechnology (DBT), Government of India has started a new initiative “Artificial Intelligence Applications for Affordable and Accessible Healthcare - Big Data and Genomics” to engage researcher across the Indian research laboratories/institutions/universities in developing AI based solutions and tools to unlock clinically relevant information hidden in the massive amount clinical data questionnaires. Such tools would assist clinical decision making on disease prediction and prognosis evaluation. AI solutions are also believed to help in early detection and diagnosis of diseases, explore therapy choice, patient monitoring and care.

The DBT intends to develop a roadmap to undertake activities in AI and big data by bringing in all stakeholders including academic and industry experts. Two major projects initiated are Genome India which will help in cataloguing the genetic variation in Indians and Earth BioGenome Project (EBP) on sequencing, analyzing, annotating and interpreting 1000 medicinal plants and few pilot studies for taking prototypes for early screening and diagnosis of diabetic retinopathy, breast cancer and cardiovascular diagnosis.

Also a comprehensive data sharing policy will be framed that will contain guidelines for data standards, format, tools and accessibility options. A new program on complex systems at CoE at Jawaharlal Nehru University (JNU), New Delhi with support of excellent computational and communication infrastructure, computer clusters, multiprocessors nodes, large memory nodes etc to facilitate specialized research. The JNU has been very actively engaged in comparative genomics, structural biology, biological evolution, simulation, data-mining, big data analysis, artificial intelligence, *in silico* drug design, etc.

Other platform which can play major role in taking forward the AI based health care initiative include the CoE Indian Institute of Science (IISc), Bangaluru, which is involved in development of new algorithms, internet computing, structural analysis structural, computational immunology etc. The centre has also developed software packages for structural biology such as CSSP, MIPS, FAIR and SSMBS.

Similarly, the CoE in Bose Institute, Kolkata, has developed two web servers called as PVT (pipeline version of TopHat) and PVT Cloudfor implementing PVT pipeline in cloud computing systems. Besides it, centre is actively involved in genome analysis, molecular evolution, genetic engineering, structural bioinformatics etc.

Centre at Madurai Kamaraj University (MKU), Madurai is actively involved in structural bioinformatics of membrane proteins, protein aggregation in human disease, structural genomics of prophage proteins etc.

Other centres involved in such studies are CoE, Pune University, Pune, which has developed a number of databases and server *viz.* phylogeny server, Human rhinovirus server, Bio Db extractor, IRESPred server for cellular and viral internal ribosome entry sites prediction etc.

The 'Artificial Intelligence Applications for Affordable and Accessible Healthcare - Big Data and Genomics' will help in developing AI programs for diagnosis processes; treatment protocols; drug designing, synthesis of personalized medicine, follow up of patient for priority diseases such as cancer, tuberculosis, cardiomyopathy, diabetic retinopathy, genetic diseases etc. the initiative will also be involved in generation, quality assurance, storage, curation, annotation and distribution of new and existing high-throughput data.

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