GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJYA SABHA
UNSTARRED QUESTION NO. 2083
TO BE ANSWERED ON 21.12.2023

Use of AI and machine learning research

2083 Smt. Sangeeta Yadav:

Will the PRIME MINISTER be pleased to state:

(a) the status of use of artificial intelligence (AI) and machine learning research undertaken by research institutes under the Department of Atomic Energy (DAE) in the last five years;
(b) the details of the projects and programmes undertaken by various research institutes under DAE in collaboration with academic institutions in these domains;
(c) the funds allocated and utilised by scientific research institutes under DAE for AI and machine learning research and development in the last five years along with the achievements and outcomes thereof; and
(d) the position of India vis-a-vis other countries in AI research?

ANSWER

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND PRIME MINISTER'S OFFICE (DR. JITENDRA SINGH):

(a) Sir, Artificial Intelligence (AI) and Machine Learning (ML) based research undertaken by Department of Atomic Energy (DAE) in last five years is mentioned below :

Sr No	Research details
1.	AI based Content verification and anomaly detection
2.	AI based Physical Intrusion Detection
3.	Biometric and Face Recognition
4.	Vehicle Identification and Management
5.	Application Behavior and Anomaly Detection
6.	Human Interface Development
7.	Robotics
8.	Image Processing
9.	Medical and Bio medical

10.	AI/ ML development platform and hardware
11.	High-Performance Computing - job scheduling, resource utilization prediction, Nuclear Knowledge Management and optimization problems in Nuclear environments
12.	Medical thermal images for breast cancer, eye diseases and diabetes mellitus
13.	AI-algorithm based application to identify the near optimal value of the operating parameters of the electron synchrotrons for control system of Accelerators
14.	An operating support system developed using Swarm intelligence and AI-based expert system to maximize the beam injection efficiency without operator intervention for control system of Accelerators
15.	AI and ML algorithms/methodologies are used in Machine Vision based Inspection systems for inspection & quality control of Nuclear Fuel & Nuclear Fuel Assembly Components.
16.	Qualitative and quantitative analysis of different grades of steel by applying ML-based algorithms trained over spectral data from Laser Induced Breakdown Spectroscopy.
17.	Development of ML-based systems/techniques for Raman Spectroscopy
18.	A multi-staged ML model is developed and evaluated to detect fraudulent connections.
19.	Study on ML models for IPv6 address lookup in large block lists
20.	Study, Design and Development of ML-based technique for SPAM detection.
21.	Statistical modelling and ML were used to extract meaningful insights from CHSS Medical Data at RRCAT which includes prevalence and patterns of diseases, correlation among ailments/ symptoms, seasonal patterns, CHSS beneficiary profiling etc.

(b) In past 5 years, Department of Atomic Energy collaborated with academic institutions for various AI/ML related research projects and programmes which are Robust Shape based Face Recognition System & Robust and Scalable Computer Vision Systems for Smart Multi Camera Video Surveillance.

The details of the projects and programmes undertaken in collaboration with academic institutions in these domains are :

(i) Early detection of breast cancer using thermal/infrared imaging. AI application for classification of the lesions mapped by infrared images.

(ii) Diabetic eye diseases detection and classification using Convolutional Neural Network (CNN).

(iii) Unsupervised radiation field mapping inside cyclotron vault

(iv) Unsupervised area surveillance by drone

(v) Indian sign language coder and decoder

(vi) Video compression for low bit rate video conferencing

(vii) Neutron Gamma separation for DAQ system

(c) & (d)

Artificial Intelligence and Machine Learning related research is carried out through projects in last five years. 3 Projects costing Rs. 180 crores were under execution and around Rs. 53 crores have been utilized.

AI and ML research along with high performance computing has enabled processing of large volumes of data. This has resulted in development of applications in all the domains. It has also led to several developments in Security and Cyber Security. Development of AI based video analytics and Cyber Security tools were initiated and has resulted in mature technologies. Indigenous products such as Secured Network Access System (SNAS) has become a backbone of Cyber security.

DAE network is a very large network and millions of events are generated every day. Event Monitoring Systems, designed to analyze massive amounts of data and provide summarized results for display has been developed and integrated with SNAS. These systems operate seamlessly round the clock (24/7), ensuring continuous vigilance and timely insights.

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