Earth-shattering Role of Statistics in Computational Sciences

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ABSTRACT

In this paper, we focused on the different applications of Applied Statistics in the emerging fields of Computer Science and Information Technology. Statistics play a vital role in data analysis and exploration, machine learning & artificial intelligence, risk management & cyber security, data-driven decision making etc. Statistical techniques not only helps make scientific models but it quantifies the reproducibility and reliability associated with these models. In the current scenario, large amount of data is recorded automatically with the help of computers and this data is managed with the data base management system (DBMS) for storage and fast retrieval purpose. The most effective approach to access and alter data is determined statistically using techniques like cost-based optimization and query execution plans. Also Artificial intelligence (AI) depends heavily on statistics since it serves as the basis for many of the algorithms and methods employed in AI, Machine learning models are created using methods including clustering, classification, and regression analysis. Natural Language Processing (NLP): NLP is the study of how computers comprehend and interpret human language. To find patterns and correlations in linguistic data, NLP uses statistics. We will discuss many applications of statistics in AI and neural networks like to enhance the performance of the network, statistics are utilized to assess the training data and modify its parameters We will talk about a number of implementations of statistics in software engineering like to examine software metrics and spot patterns and trends in software systems, statistical methods like principal component analysis and clustering are utilized. These studies assist software engineers in locating aspects of the software system that affect the course and in generating defensible choices regarding the best way to proceed. In order to anticipate software system problems, statistics are utilized. Models that forecast the risk of software faults happening in the future are created by studying historical data on software defects using statistical techniques like regression analysis and machine learning. We will discuss various applications of statistics in the production of hardware e.g., Statistics are used to assess product quality and find flaws and other quality problems, Design of Experiments (DOE): DOE is a statistical method for planning experiments to examine the impact of various variables on a manufacturing process. DOE is used to determine the best production method for a product in the hardware industry. We will discuss many applications of statistics in bioinformatics like analysis of biological data, such as DNA sequences and protein structures. Here we discuss the different statistical approaches in computational sciences.

Keywords: Statistics, Artificial Intelligence, Computational Sciences