Journal of Global Research in Computer Sciences e-ISSN: 2229-371X

Data Driven Languages and Limitations Involved in Machine Learning

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Commentary

Received: 02-Nov-2022, Manuscript No. GRCS-22-82766; **Editor assigned:** 07-Nov-2022, PreQC No. GRCS-22-82766 (PQ); **Reviewed:** 14-Nov-2022, QC No. GRCS-22-82766; **Revised:** 28-Nov-2022, Manuscript No. GRCS-22-82766 (R); **Published:** 05-Dec-2022, DOI: 10.4172/2321-6212.13.5.002

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DESCRIPTION

Machine Learning (ML) is a branch of research concerned with understanding and developing methods that 'learn,' methods that use data to improve performance on a set of tasks. It is regarded as a component of artificial intelligence.

Machine learning algorithms are used in a wide range of applications, including medicine, email filtering, speech recognition, agriculture, and computer vision, where developing traditional algorithms to perform the required tasks would be difficult or impossible.

Limitations

Bias: Machine learning approaches, in particular, are susceptible to various data biases. A machine learning system that has only been trained on current customers may be unable to predict the needs of new customer groups that are not represented in the training data. When trained on artificial data, machine learning is likely to detect constitutional and unconscious biases that already exist in society. Data-driven language models have been shown to have human-like biases. The effective use of machine learning in other domains may take longer. Concern for fairness in machine learning, that is, reducing bias in machine learning and propelling its use for human good, is being expressed increasingly by artificial intelligence scientists, including Fei-Fei Li, who reminds engineers that "AI isn't manufactured in any way. It is inspired by people, created by people, and, most importantly, has an impact on people. It is a powerful tool that we are only now beginning to comprehend, and that comes with great responsibility."

Explainability

Explainable AI (XAI), also known as Interpretable AI or Explainable Machine Learning (XML), is a type of Artificial Intelligence (AI) in which humans can understand the AI's decisions or predictions. It contrasts with the "black box"

concept in machine learning, in which even the designers are unable to explain why an AI made a particular decision. XAI promises to help users perform more effectively by refining their mental models and dismantling their misconceptions. XAI could be an example of the social right to explanation in action.

Other limitations and vulnerabilities

Learners can also let themselves down by "learning the wrong lesson." In the real world, unlike humans, current image classifiers frequently do not make judgments based on the spatial relationship between picture components, and they learn relationships between pixels that humans are unaware of but that still correlate with images of certain types of real objects. Changing these patterns on a legitimate image can produce "adversarial" images that the system incorrectly classifies.

Adversarial vulnerabilities can arise in nonlinear systems or as a result of non-pattern perturbations. Some systems are so fragile that even changing a single adversarial pixel causes misclassification. Through adversarial machine learning, machine learning models are frequently vulnerable to manipulation and/or evasion.

Researchers have demonstrated how backdoors can be hidden in machine learning models that classify (e.g., for the categories "spam" and "not spam" of posts) and are frequently developed and/or trained by third parties. Parties can change the classification of any input, including cases where data/software transparency, possibly including white-box access is provided. Hence, it requires very large amount of data in order to perform better than other techniques.