AI BASED CLASSIFICATION AND VISUALIZATION OF VARIOUS MICROBES IN MONITORING AGRICULTURAL SOIL POLLUITON USING PULIC METAGENOMIC DATA

Agricultural soil pollution poses a significant threat to ecosystem health and food security. This study includes artificial intelligence (AI) to classify and visualize diverse microbes in public metagenomic data, monitoring the impact of pollution on beneficial microorganisms. We analyzed metagenomic datasets from polluted and non-polluted agricultural soils, applying machine learning algorithms to identify and categorize microbial communities. Our results reveal significant shifts in microbial composition, with beneficial microbes declining in polluted soils. Key factors driving these changes include heavy metal contamination, pesticide use and excessive fertilizer application. AI-Driven visualization techniques illustrate the complex relationships between microbes, pollutants and soil health indicators. This research demonstrates the potential of AI-based metagenomic to inform sustainable soil management practices, mitigate pollution and preserve beneficial microbial ecosystems. Main objective is to classify and visualize microbial communities in agricultural soils using public metagenomic data; to assess the impact of pollutants on beneficial microbes; to identify bio-indicators of soil pollution using machine learning algorithms and correlate microbial changes with soil health indicators; to visualize microbe pollutant interactions using AI based techniques to understand complexity; to provide insights for sustainable soil management practices to preserve beneficial microbial ecosystem and mitigate agricultural soil pollution.