AI/ML solutions for Climate Change – Food & Climate-smart Agriculture

According to the IPCC Climate Change 2022 Report, climate change is expected to cause global temperature increases, more frequent heat waves, and shifts in climatic zones. Droughts and floods will become more severe, affecting freshwater availability and quality. These consequences have far-reaching social and economic impacts, affecting billions of people.

Nuclear technologies can help countries adapt to climate change by efficiently using limited soil and water resources for crop growth. However, addressing complex global challenges in water, food, and agriculture requires more than human expertise alone. Combining information and communications technologies (ICTs) and Artificial Intelligence (AI) offers a promising solution to tackle the climate crisis. As AI techniques mature, there will be opportunities to apply them in nuclear techniques for agriculture, including soil property estimation and soil moisture mapping using data from various sources.

The International Atomic Energy Agency (IAEA), through its Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture, has selected the following challenge for the AI/ML Solutions for Climate Change:

- *How can AI help estimate soil properties across large areas based on different data collection methods including infrared spectroscopy, gamma spectrometry techniques and satellite imagery?*

AI can play a crucial role in estimating static soil properties across large areas, as it can effectively process and analyze data obtained through various methods, with different resolution (from point to landscape), like infrared spectroscopy, gamma ray spectrometry, and satellite imagery. Through machine learning algorithms, AI can identify patterns and correlations between the collected data and soil properties. This allows for the creation of detailed and accurate soil property maps that offer valuable insights for agricultural planning, precision farming, environmental monitoring, and land management decisions. By automating this complex analysis, AI reduces human effort and accelerates the process of understanding soil characteristics on a regional or even global scale.