National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Analysis and prediction of North Indian Ocean cyclones through ML/DL-based approach
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Venue	: ER-303
Date and Time	: 07 Oct 2025 (04:00 PM)
Abstract	: Tropical cyclones (TCs) are severe weather events and cause lots of damage to life, economy, agriculture and infrastructure considerably. Accurate prediction of TCs and understanding its behavior for disaster preparedness and mitigation is a challenging task. TCs form over warm tropical Ocean, having a low pressure at their center and strong rotating winds around the core in anticlockwise (clockwise) direction in northern hemisphere (southern hemisphere). Tropical cyclogenesis (TCG) of any cyclone can be observed through a satellite image as Tropical Cloud Cluster (TCC). TC intensity is a direct measure of risk associated with TC, so its accurate prediction is essential for well preparedness and disaster management. TC rapid intensification is a special case when TC intensity increases by ~30 kts in 24 hrs. Besides several ocean and atmospheric parameters, marine heat wave plays a significant role in TC rapid intensification. Accurate track prediction is also important as it provides the trajectory of a TC and its location of landfall. In this study, ML/DL-based approach is proposed for analysis & prediction of cyclones over North Indian Ocean. Most of the ML/DL models are just black boxes we don&rsquot know what is happening behind the model. So, understanding the black box nature of ML/DL model is very important to interpret the output change with respect to inputs provided. Explainable AI (XAI) can be used to unfold the black box nature of ML/DL models. Besides, physics informed ML/DL models are expected to do a more realistic job in this sense. Therefore, such ML/DL frameworks could be used for the TC prediction over NIO region. Some preliminary results were obtained for sea surface temperature prediction and its cooling after passing of cyclones with respect to TC intensity and speed were also investigated.