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CURRENT CHALLENGES WITH THE USE OF AI ALGORITHMS IN DEEP SPACE EXPLORATION RADIO CHANNEL FORECASTING FOR DEEP SPACE SATELLITES

Abstract

This research focuses on utilizing artificial intelligence (AI) for forecasting radio channels in deep space satellites. The primary aim is to modify and enhance satellite communications by adapting neural network models currently employed for low Earth orbit satellites, making them applicable to deep space satellites. This adaptation involves considering the deep space conditions that impact the signals. Satellites in deep space, such as those orbiting Mars, can be as far as 225 million kilometers away from Earth. Additionally, there are satellites like Voyager 1, currently positioned over 22 billion kilometers away from Earth. Addressing the challenges of deep space, including solar radiation, gravitational effects, and unusual space events, requires a reevaluation and adjustment of existing communication models and protocols.

Given the difficulties inherent in deep space communication, such as changing angles of the satellite itself and the need for real-time adjustments, it highlights the importance of research that offers practical solutions to enhance space exploration overall. This involves closely examining current models, strategies, and algorithms to meet the specific demands of deep space communication. Ultimately, the research aims to comprehend the complexities related to Low Earth Orbit (LEO) satellites, paving the way for developing and implementing straightforward forecasting models designed for the unique challenges and opportunities of deep space communication systems on radio channels.

This paper will initially present the factors affecting low Earth orbit satellites which entails a model currently effective in error correction. Subsequently, it proposes an improved neural network model that considers deep space conditions and accurately addresses errors caused by these factors, ensuring seamless communication.