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# DEVELOPMENT OF A MACHINE LEARNING MODEL FOR MARTIAN ELECTRON DENSITY USING MGS DATA

**Abstract**

The availability of Martian atmospheric data provided by several Martian missions broadened the opportunity to investigate and study the uncharacterized states/patterns of the Martian ionosphere. As such, ionospheric models play a crucial part in improving our understanding of ionospheric behaviour in response to different spatial, temporal, and space weather conditions. This study utilizes data from the Mars Global Surveyor (MGS) mission to construct an electron density prediction model of the Martian ionosphere between 60 and 85 degrees latitude, using machine learning. The performance of different machine learning models was compared in terms of root mean square error, coefficient of determination, and mean absolute error. Out of all the evaluated models, the bagged regression trees method performed best. The final prediction model serves as a flexible Martian electron density prediction model that requires a minimal number of inputs while achieving good prediction performance.