**Prediction of Maximum Amplitude of Solar Cycle 25 using Machine Learning**

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ABSTRACT

Prediction of maximum amplitude of Solar Cycle 25 is obtained by using four different machine learning regression methods, i.e. Linear Regression (LR), Random Forest (RF), Radial Basis Function (RBF) and Support Vector Machine (SVM). Monthly mean sunspot number data during the 1856-June 2018 (solar cycles 10-24) from the World Data Center SILSO, Royal Observatory of Belgium, Brussels are used as machine learning inputs. According to LR, RF, RBF and SVM, the maximum of Solar Cycle 25 is predicted to occur in September 2023 (sunspot number of 159.4±22.3), in December 2024 (sunspot number of 110.2±12.8), in December 2024 (sunspot number of 95.5±21.9) and in July 2024 (sunspot number of 93.7±23.2), respectively. The prediction using LR method suggested that the Solar Cycle 25 maximum will be slightly higher than the current cycle, while RBF and SVM suggested much lower cycles. RF prediction suggested a lower maximum with well-constructed double-peak. It was also found that the Solar Cycle 25 is predicted to begin in the late 2019 or early 2020 according to all four methods.

*Keywords: Solar Activity; Solar-Cycle Prediction; Machine Learning; Sunspot Number*

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