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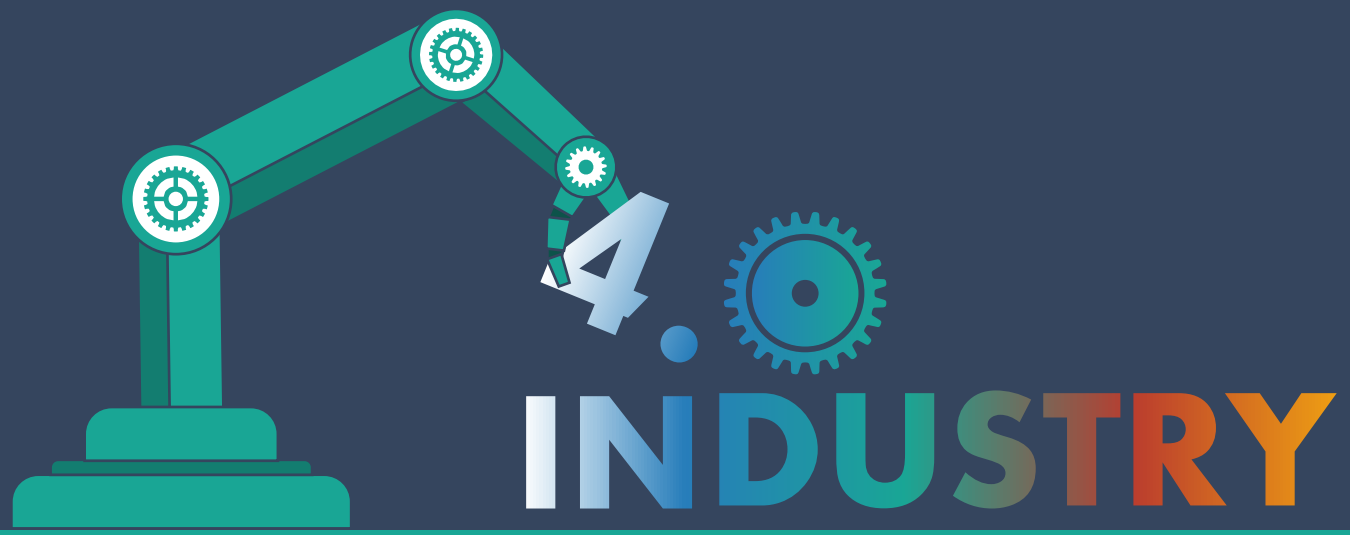

REVIEW OF FORECASTING THE CRITICAL FREQUENCY OF THE IONOSPHERIC F2 LAYER

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Abstract

This review considered 7 journals over last 5 years as primary references.

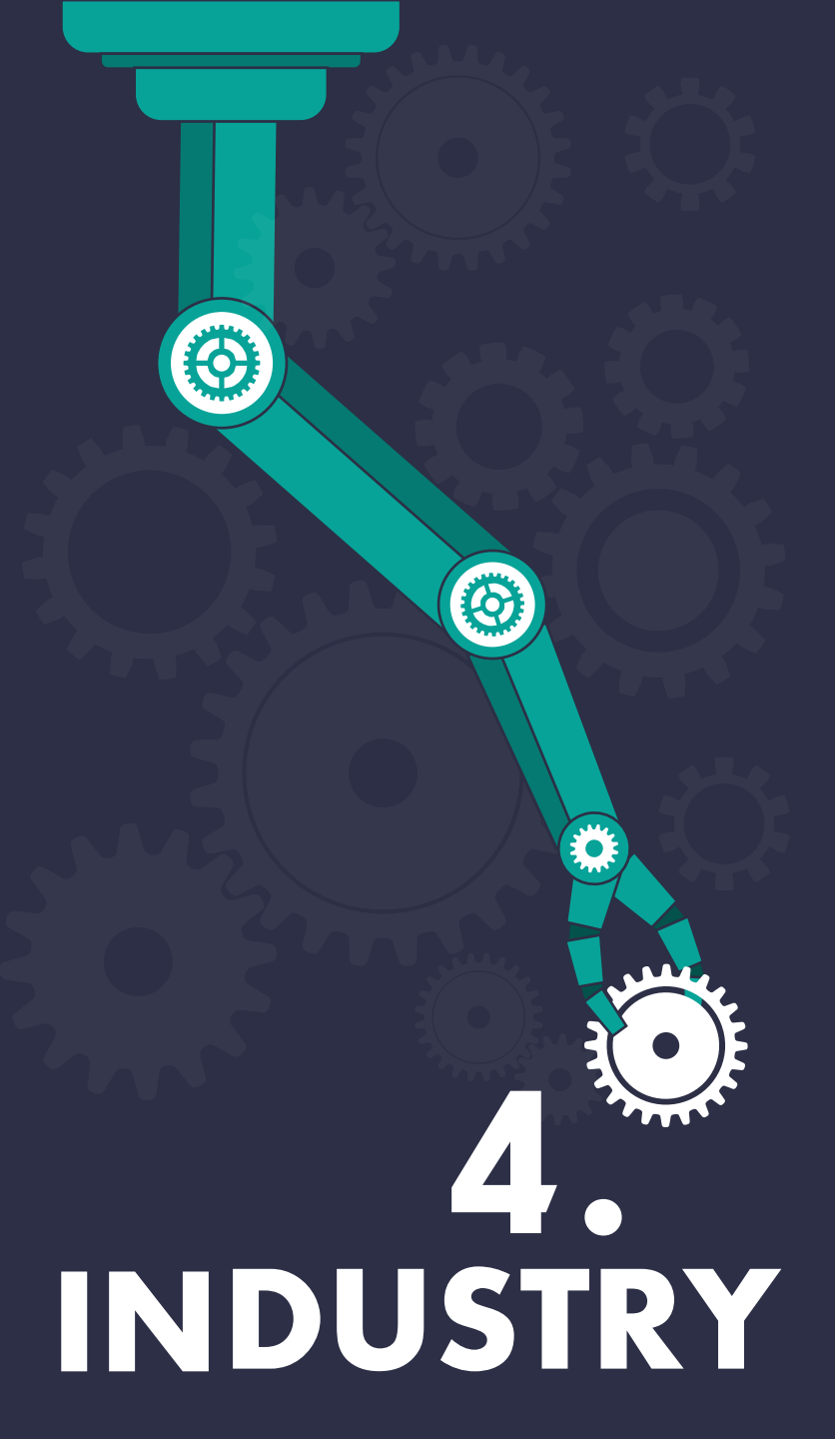
- References all in the field of forecasting ionospheric F2 layer under quiet and disturbed conditions.

Basis search divided into two major domains

- Principles of ionospheric critical frequency.
- Methods for forecasting foF2.

Proposed differentiation enables future research on

- Factors that affect the variability of foF2.
- Methods used in foF2 prediction



Introduction

1. Aim

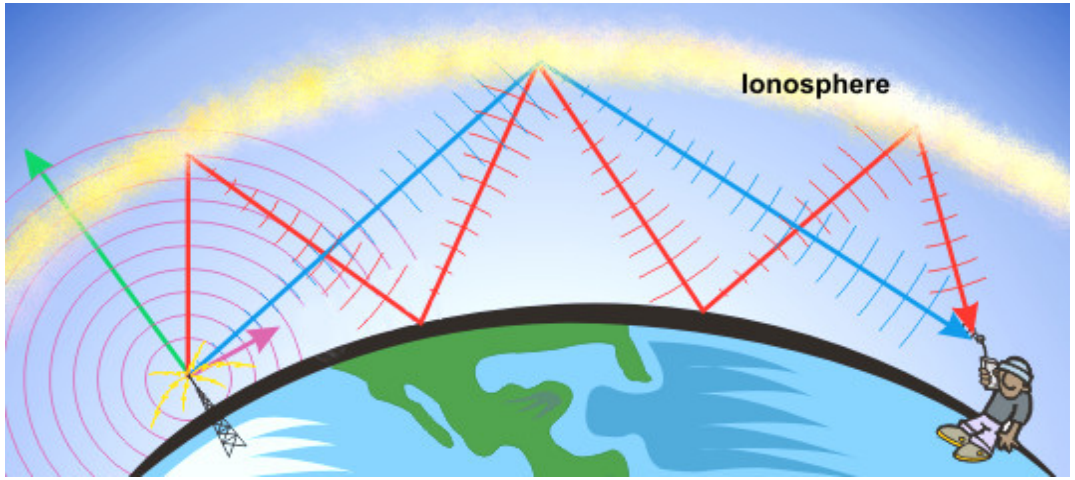
The current review paper aims to extend the neural network principle to foF2 forecasting and the response of foF2 to solar and geomagnetic activities under normal and disturbed conditions.

2. Objectives

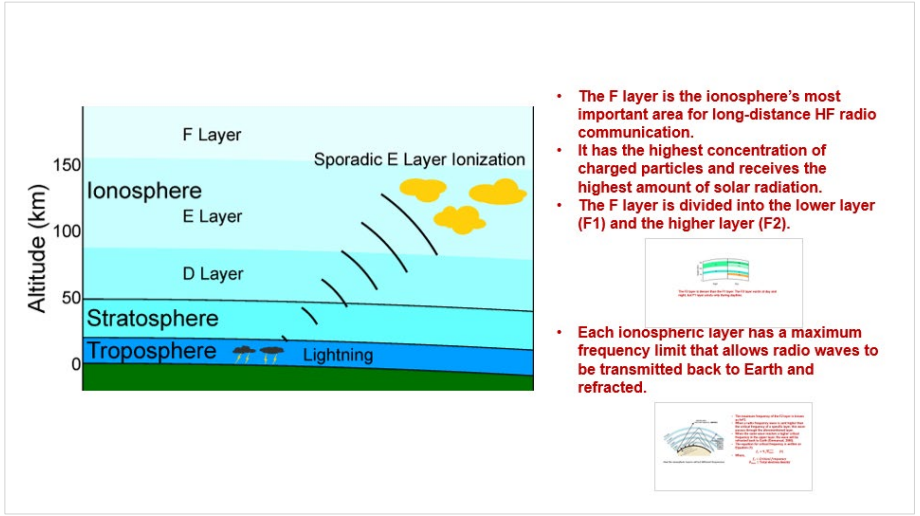
This review focuses on three objectives to resolve the overarching goal.

- **2.1.** foF2 and how it varies diurnally and seasonally are studied
- **2.2.** Analyze the effects of solar activities, including sunspot number and solar flux F10.7, on foF2 variability.
- **2.3.** How foF2 works under normal and disturbed conditions by relating solar geomagnetic indexes

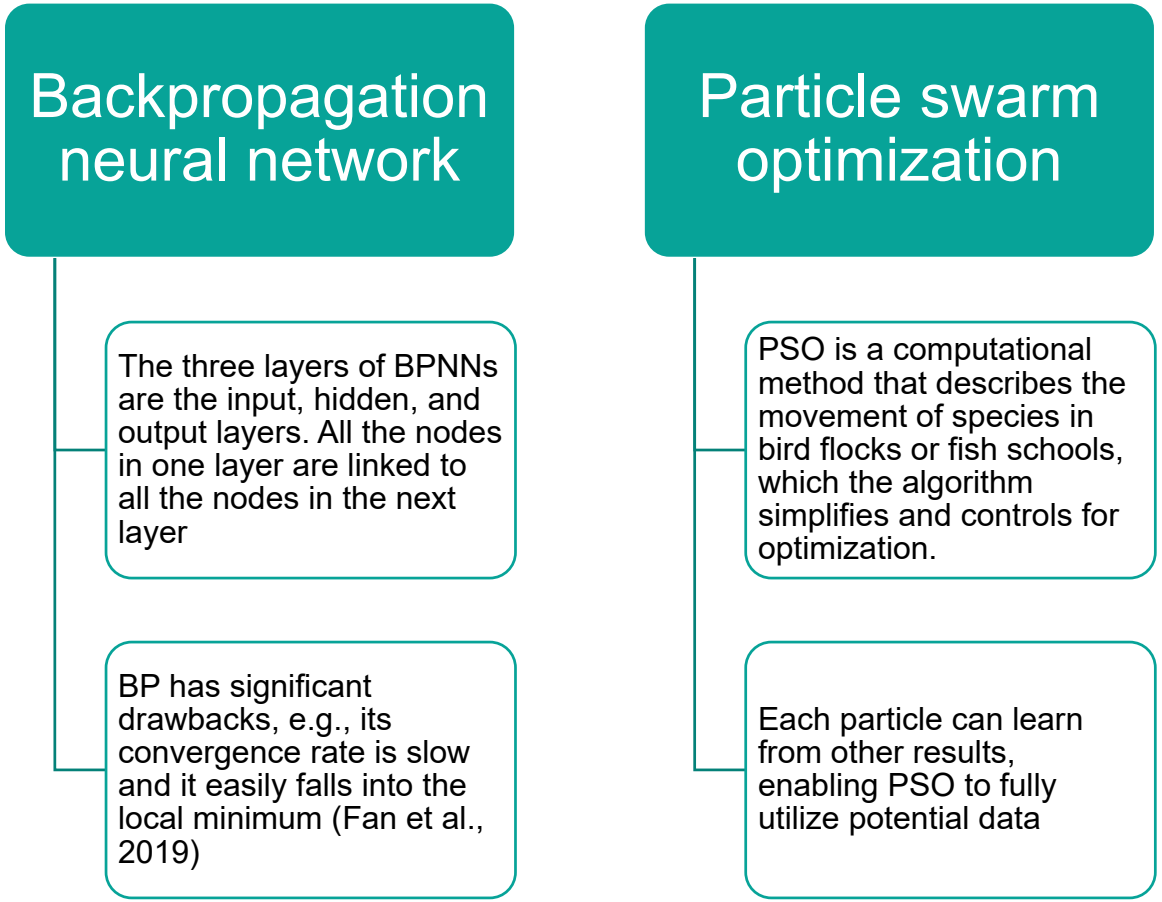
What is ionosphere layer?



- **The ionosphere is the ionized part of the upper atmosphere of the earth from approximately 60 km up to 1,000 km in altitude.**
- **The ionosphere is a region wherein atoms and molecules are ionized by extreme ultraviolet radiation and solar X-rays.**
- **This phenomenon produces multiple layers, called D, E, and F.**



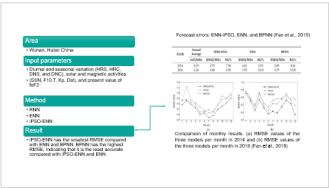
Method of ionospheric F2 layer critical frequency prediction



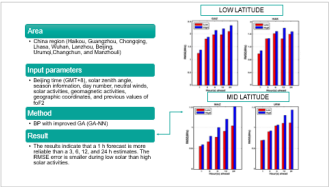
General findings and study background

main references

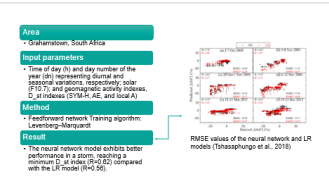
Short-term forecast model of foF2 based on ENN (Fan et al., 2019)



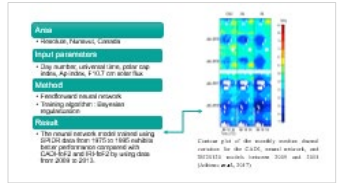
Ionosphere foF2 disturbance forecasting using neural network improved by a Genetic Algorithm (Zhao et al., 2019)



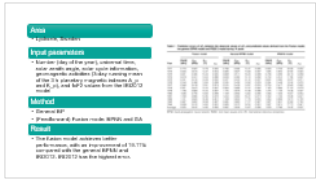
Modeling ionospheric foF2 response during geomagnetic storms using neural network and LR techniques (Tshisaphungo et al., 2018)



Neural network based foF2 model for a single station in the polar cap (Athieno et al., 2017)

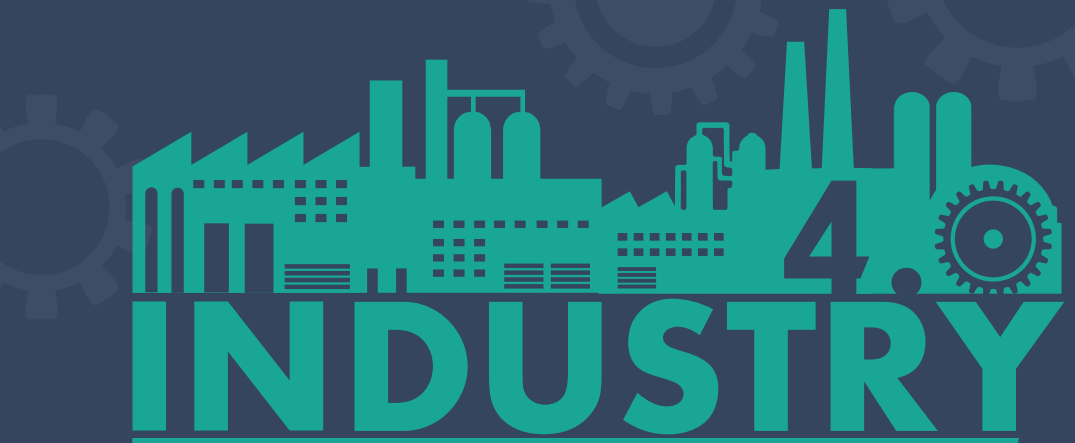


Predicting ionospheric critical frequency of the F layer over Lycksele by using neural network improved with an error compensation technology (Zheng et al., 2016)



CONCLUSION

This review highlighted the factors that influence foF2 variability, such as the number of hours in a day and solar and geomagnetic activities. Moreover, several researchers have used specific methods for predicting foF2 under quiet and disturbed conditions. The two types of method that are mostly used by researchers are empirical and neural network methods. However, this study focused on neural network methods because some researchers found that neural network methods are apparently better than empirical methods in foF2 prediction. The findings of this review indicate that variables, such as hours of a day and solar and geomagnetic activities, undoubtedly affect foF2 variability.



Thank You