ABSTRACT

TYPE-2 FUZZY TIME SERIES FORECASTING WITH GREY WOLF OPTIMIZER-BASED CLUSTERING TECHNIQUE ON THE INDONESIA COMPOSITE INDEX

By
Annis Zuhriatun Nafisah
NIM : 24010122420008
Master of Mathematics, Faculty of Science and Mathematics, Diponegoro University

Fuzzy Time Series (FTS) Type-2 is the development of FTS Type-1. Type-2 FTS uses more than 1 variable and its membership degree is considered as a fuzzy set. Type-2 FTS also has advantages in accuracy by expressing a lot of information and the error in forecasting using Type-2 FTS is lower when compared to using Type-1 FTS. To get more accurate results, this method requires optimal data partitioning for fuzzy interval determination. Therefore, this research proposes the use of the Grey Wolf Optimizer (GWO) algorithm as a clustering method to form optimal data partitions. GWO is an algorithm inspired by the leadership hierarchy and hunting mechanism of gray wolves that has the advantages of simplicity and fast search speed. Therefore, this study aims to perform Type-2 FTS forecasting with GWO-based clustering techniques. This research also uses Levy flight as an additional strategy in GWO to increase exploration. The development is applied to the daily data of the Indonesia Composite Index (ICI). The results of FTS Type-2 forecasting research with GWO Levy Flight-based clustering technique show the ability of GWO in improving forecasting accuracy. This is evidenced by the AFER value of Type-2 FTS forecasting based on GWO Levy flight is smaller than Type-2 FTS forecasting without GWO Levy flight, namely 1,404 < 2,402. The accuracy of GWO Levy flight clustering-based forecasting is 98,596%. This shows that FTS Type-2 forecasting with GWO-based clustering techniques has very good results.

Keywords: Fuzzy Time Series (FTS) Type-2, Grey Wolf Optimizer (GWO), Levy flight, Indonesia Composite Index (ICI)