Chapter 15
Fuzzy Time Series: An Application in E-Commerce

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ABSTRACT

In this chapter, we are planning to make a comparison between conventional Time Series Models and Fuzzy Time Series Models by an application in an e-commerce company. Future sales of furniture will be predicted. The performance of different models and forecasting periods are going to be analyzed to discuss advantages and disadvantages of each method. MAE is chosen as performance indicators of each model and forecasting period combination. As a conclusion to this chapter, generic strategies for prediction in an e-commerce company will be formulated in consideration of these indicators.

1. INTRODUCTION

“Forecasting is about predicting the future as accurately as possible, given all of the information available, including historical data and knowledge of any future events that might impact the forecasts” (Hyndman & Athanasopoulos, 2014). On the other hand, “digital marketing is the marketing which aims to promote brands and reach customers by using all advertisement segments in an electronic medium” (Kahraman et. al, 2015).

This chapter introduces an application of fuzzy time series for a furniture company which makes sells via online. Time series is a part of forecasting methods and such a vague environment like we have, using time series with fuzzy methods is the most appropriate way for forecasting. So in this framework, we search the Scopus database for forecasting, fuzzy time series and e-commerce, then give the obtained review results in tabular and graphical forms.

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Our chapter is organized as follows. We would like to introduce a mixed way of forecasting and
digital marketing, an application of e-commerce for possible solutions with fuzzy time series. Section
2 presents digital marketing. Section 3 presents forecasting and its characteristics. Section 4 presents
fuzzy logic. Section 5 presents fuzzy time series and includes a brief literature review about it. Rest of
the chapter starts with the Singh’s method, follow as Hwang-Chen- Lee’s method, regression analysis,
and double exponential smoothing using Holt’s Method then ends with a conclusion.

2. DIGITAL MARKETING

The Digital Marketing Institution’s (DMI) definition for digital marketing is “The use of digital technolo-
gies to create an integrated, targeted and measurable communication which helps to acquire and retain
customers while building deeper relationships with them”.

Digital Marketing’s definition for digital marketing is “Digital Marketing is a sub-branch of traditional
Marketing and uses modern digital channels for the placement of products e.g. downloadable music, and
primarily for communicating with stakeholders e.g. customers and investors about the brand, products,
and business progress” (Royle & Laing, 2014).

The concepts “digital marketing” and “e-commerce” are often misused interchangeably. The synonyms
to digital marketing are e-marketing, online marketing, or web-marketing and it is related to e-commerce
in that manner digital marketing is the tool supporting e-commerce process with supplementary ways
such as email marketing, search engine marketing, and social media marketing. Section 6 introduces
methods that what we are going to use and includes Singh’s method.

Some areas of digital marketing can be sorted as below:

- Advanced Search Engine Optimization (SEO),
- Advertising Support,
- Brand Management,
- Campaign Management,
- Competition Tracking,
- Digital Public Relations,
- E-Commerce,
- Event Management,
- Export Marketing,
- Impact Analysis,
- Mobile Marketing,
- Social Media Management,
- Training,
- Web Analytics, and
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