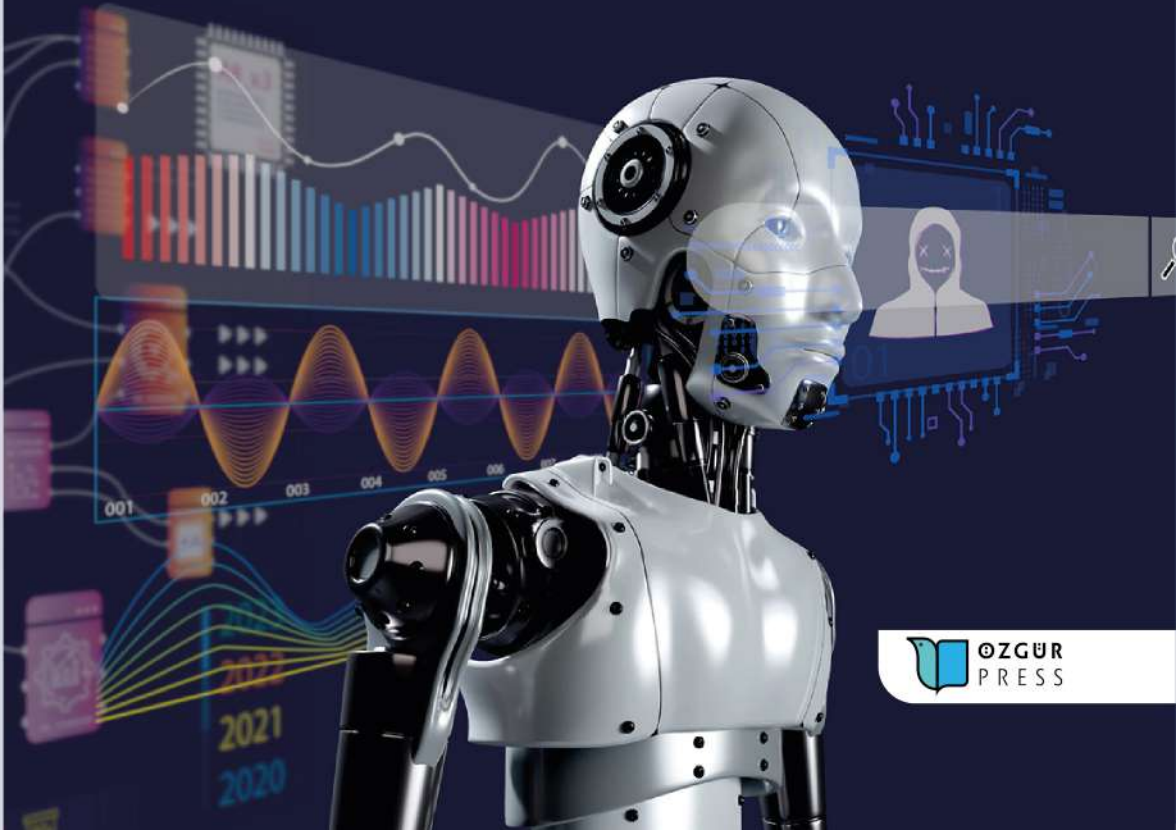


Current Approaches in Applied Statistics - I

Editors: Assoc. Prof. Yalçın TAHTALI • Assoc. Prof. İbrahim DEMİR
Assist. Prof. Lütfi BAYYURT



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Preface

This book, titled *Current Approaches in Applied Statistics*, is a compilation of recent academic studies produced by researchers from different disciplines. The book covers not only theoretical contributions in the field of statistics, but also the innovative dimensions of methods used in a wide variety of application areas.

Today's rapidly increasing volume and diversity of data has led statistics to transcend being a science based solely on mathematical foundations and take on a critical role in many fields, from health sciences to engineering, social sciences to environmental research. Reflecting this broad sphere of influence, this book aims to present readers with both theoretical approaches and application examples from different disciplines.

The chapters in this book, prepared with contributions from international researchers, highlight the current importance of statistics, the methodological challenges encountered, and new solutions. Readers will encounter content that is useful both academically and practically in areas such as statistical modeling, data mining, machine learning, biostatistics, and social statistics.

We believe this work will provide researchers, graduate students, and practitioners with a comprehensive overview of current approaches to statistics. We thank all the authors and reviewers who contributed to this book and hope it will make a valuable contribution to the scientific community.

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The Impact of Climate Variables on Wheat Yield in Turkey

Melike Tekin¹

Gülistan Erdal²

Abstract

In recent years, global warming and climate change have been affecting agricultural production both directly and indirectly. Rising temperatures, changing precipitation patterns, and extreme weather events have significant impacts on the yield of many crops. In Turkey, which is located in a semi-arid climate zone, this variability becomes even more pronounced. Staple cereal crops such as wheat are particularly sensitive to fluctuations in temperature and precipitation, and climatic anomalies occurring during critical growth stages can lead to substantial yield losses. This study aims to examine the effects of climate variables on wheat yield in Turkey. The dataset covers the period from 2004 to 2024. Wheat yield (Y , kg/ha) was used as the dependent variable, while climate-related independent variables (X_i) included temperature ($^{\circ}\text{C}$), average precipitation (mm), the Southern Oscillation Index (SOI), and the Oceanic Niño Index (ONI). The SOI and ONI indicators employed in the study provide important parameters for understanding the impact of large-scale climatic oscillations on crop yields. In this context, ocean-atmosphere interactions such as the El Niño–Southern Oscillation (ENSO), which operate on a global scale, create significant regional and temporal variability in agricultural production. The results of the multiple linear regression analysis show that the model is statistically significant, with a high coefficient of determination ($R^2 = 64.3\%$). Among the climate variables, temperature and SOI were found to be statistically significant. In particular, SOI was determined to have a strong and positive effect on wheat yield. The analysis results reveal that climate indicators play a critical role

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