

STA 325 Case Study

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Introduction

Whether it's stirring a morning cup of coffee or feeling your stomach lurch during a bumpy airplane ride, nearly everyone has experienced some form of turbulence. Beyond these everyday encounters, turbulence plays a crucial role in many complex natural and industrial processes — from air pollution and chemical reactions to heat transfer and weather systems. Despite its ubiquity, turbulence remains notoriously difficult to predict and has long been regarded as “the last great unsolved problem in classical physics.”

While we may not be physicists ourselves, as members of Stat 325, we have undertaken the challenge of developing a predictive model to better understand this elusive phenomenon in collaboration with our Professor, Simon Mak. Specifically, we have explored models designed to predict the mean, standard deviation, skewness, and kurtosis of turbulence. Our goal is to create a model that balances predictive accuracy with interpretability; one that not only performs well statistically but also provides clear, meaningful insights into how different conditions influence turbulent behavior.

Exploratory Data Analysis

Methodology

Results

Conclusion