

Data Science and Analytics Thrust, Information Hub  
The Hong Kong University of Science and Technology (Guangzhou)



# MAIN TITLE

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This is a subtitle

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# OUTLINE

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## 1 Introduction

Research Overview

Literature Review



### Motivations:

- » Overcome limitations of traditional methods in handling complex, dynamic environmental data.
- » Leverage insights from the success of Graph Neural Networks (GNNs) in sectors such as traffic and energy to enhance spatial-temporal analysis.

### Contributions:

- » Combines Graph Convolutional Networks (GCN) and Recurrent Neural Networks (RNN) to model evolving inter-regional relationships and spatial-temporal dynamics.
- » Boosts predictive accuracy and offers comprehensive insights to guide environmental policy.
- » Facilitates informed, real-time policy decisions adapted to specific regional contexts.

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## Statistical and Machine Learning Approaches

### » Statistical Methods:

- **ARIMA Models:** Employed for time series forecasting; adjusts for trends and seasonality.
- **Grey Forecasting Models (GM):** Effective under conditions of limited or incomplete data, applicable in emerging markets.
- **Hybrid Models:** Combining GM and ARIMA to address non-linear and non-stationary data, enhancing forecast accuracy.

### » Machine Learning Methods:

- **Deep Learning:** Excels in learning complex data patterns, significantly improving prediction capabilities.
- **Hybrid Approaches:** Integration of neural networks with statistical methods boosts accuracy and reliability.
- **Regional Variability:** Challenges include accommodating diverse environmental conditions, impacting scalability and model performance.

## References



THANK YOU!