



ChatGPT for Scientific Writing: Navigating Potentials and Challenges

Simone Silvestri

Associate Professor

Computer Science Department, University of Kentucky

Email: silvestri@cs.uky.edu

Web: <http://silvestri.engr.uky.edu/>

YouTube: <https://www.youtube.com/@csmentor5482/>

CSMentor on YouTube



@csmentor5482

How to write
an Abstract?



How to get a Research or
Teaching Assistantship?



How to review
a conference
paper?



How to write an
Introduction?



What is ChatGPT?

- ❑ Large Language Models
- ❑ Developed by OpenAI
- ❑ ChatGPT specifically designed for conversational AI
- ❑ Based on Transformer architecture (encoder-decoder + self-attention)
- ❑ Google developing similar technology with BardAI



ChatGPT



BARD

ChatGPT for Academic Writing

- ❑ ChatGPT & similar tools are/will be available to our students
- ❑ Writing papers is a natural applications of these technologies
- ❑ Can these technologies be of actual help?
- ❑ In this talk:
 - Can we use ChatGPT to write an Abstract?
 - Can we use ChatGPT to write a Related Work section?
 - What are the current regulations of using ChatGPT?
 - Questions with no answer (yet)

Can ChatGPT write an Abstract?

Can you write an abstract of a research paper, in less than 200 words, about a network tomography approach for traffic monitoring in smart cities?



[ChatGPT Mar 14 Version](#). Free Research Preview. Our goal is to make AI systems more natural and safe to interact with. Your feedback will help us improve.

R. Zhang, S. Newman, M. Ortolani, S. Silvestri "A Network Tomography Approach for Traffic Monitoring in Smart Cities" in IEEE Transactions on Intelligent Transportation Systems, Vol. 19, Issue 7, 2018

The Abstract



Title: Network Tomography Approach for Traffic Monitoring in Smart Cities

Abstract: Smart cities are becoming increasingly popular due to their ability to integrate advanced technologies for efficient traffic management. However, traditional traffic monitoring methods have limitations in providing accurate and real-time traffic information. In this paper, we propose a network tomography approach for traffic monitoring in smart cities.

The proposed approach utilizes a novel algorithm for the estimation of traffic flow distribution. This algorithm is designed to overcome the limitations of traditional methods by providing more accurate and real-time traffic information. The results show that our approach can achieve high accuracy in estimating the traffic flow distribution with a low error rate. Compared to traditional traffic monitoring methods, our approach provides more detailed and real-time traffic information, which can support various traffic management applications, such as congestion control and route optimization.

Regenerate response

196 words!

Components of an Abstract

- 1) What is the problem and why is it important?
- 2) What are the limitation of existing solutions?
- 3) What is proposed and what are its advantages?
- 4) How does it work?
- 5) Summary of results

What is the problem and why is it important?



“Smart cities are becoming increasingly popular due to their ability to integrate advanced technologies for efficient traffic management.”

What are the limitation of existing solutions?



ChatGPT

“However, traditional traffic monitoring methods have limitations in providing accurate and real-time traffic information.”

What is proposed and what are its advantages?



“In this paper, we propose a network tomography approach for traffic monitoring in smart cities. The proposed approach utilizes the concept of network tomography, which enables the estimation of traffic flow on each road segment by analyzing the end-to-end delay measurements between pairs of monitoring points.”

How does it work?



“We develop a novel algorithm that combines the maximum likelihood estimation and the expectation-maximization algorithm to estimate the traffic flow distribution.”

Summary of results



“To evaluate the effectiveness of our proposed approach, we conduct experiments on a real-world road network in a smart city. The results show that our approach can achieve high accuracy in estimating the traffic flow distribution with a low error rate. Compared to traditional traffic monitoring methods, our approach provides more detailed and real-time traffic information, which can support various traffic management applications, such as congestion control and route optimization.”

Overall assessment

- Good structure
- State of the art needs to **be checked**
- Proposed research needs to be **changed**
- Expectations flow can be **improved**
- Results need more **details**

- Overall: it is a **good starting point**



Can ChatGPT write a Related Work section?

S

Can you write the related work section of a research paper, including citations? The paper proposes a Human-Centered Power Conservation Framework based on Reverse Auction Theory and Machine Learning

E. Casella, A. R. Khamesi, S. Silvestri, D. A. Baker, S. K. Das,
"HVAC Power Conservation through Reverse Auctions and Machine Learning" in Proceedings of the
IEEE International Conference on Pervasive Computing and Communications (PerCom), 2022



ChatGPT

“Energy conservation has become a major concern in recent years due to the increasing demand for energy and the impact of energy consumption on the environment.”



ChatGPT

“Various approaches have been proposed to reduce energy consumption in residential buildings. One such approach is the use of smart meters and real-time feedback to provide users with information about their energy usage and encourage them to adopt energy-saving behaviors [1].

However, research has shown that these approaches are not effective in changing user behavior in the long term [2].”

Demand Response



“Another approach is to use financial incentives to motivate users to reduce their energy consumption. The use of economic incentives such as time-of-use pricing and demand response programs has been shown to be effective in reducing peak energy demand and shifting energy consumption to off-peak periods [3].

However, these approaches do not consider the user's preferences and may not be suitable for all users.”

Reverse Auctions



“Reverse auction theory has been used in the context of energy markets to allocate energy resources efficiently [4]. The idea is to allow buyers to bid for energy resources, and the seller chooses the bids that maximize their profit. The same concept can be applied to incentivize energy conservation in residential buildings. By allowing users to bid for energy savings, they are incentivized to adopt energy-saving behaviors that result in actual energy savings.”



ChatGPT

“Machine learning has been used in the context of energy conservation to develop predictive models that can forecast energy consumption and optimize energy usage [5].

These models can be used to provide personalized recommendations to users and improve the effectiveness of energy conservation programs.”



ChatGPT

“The proposed framework combines the use of reverse auction theory and machine learning to develop a human-centered approach to energy conservation. **By allowing users to bid for energy savings**, the framework incentivizes energy-saving behaviors that are aligned with user preferences. The use of machine learning enables personalized recommendations that are tailored to each user's energy consumption patterns.”

Citations



ChatGPT

- [1] Darby, S. (2006). The effectiveness of feedback on energy consumption: A review for DEFRA of the literature on metering, billing and direct displays. Environmental Change Institute, University of Oxford.
- [2] Faruqui, A., Sergici, S., & Sharif, A. (2010). The impact of informational feedback on energy consumption—A survey of the experimental evidence. *Energy*, 35(4), 1598-1608.
- [3] Li, H., Xu, Z., Sun, W., Wang, L., & Zhang, J. (2015). A review of demand response in smart grid. *Renewable and Sustainable Energy Reviews*, 44, 569-582.
- [4] Kwon, H. J., & Chae, Y. M. (2017). Energy auction mechanism for energy management in a smart grid environment. *Journal of Ambient Intelligence and Humanized Computing*, 8(2), 247-256.
- [5] Hong, T., Yan, D., & D'Oca, S. (2017). Machine learning algorithms for predicting building energy consumption: A review and comparative analysis. *Applied Energy*, 194, 135-162.



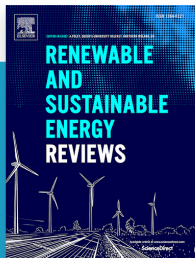
ScienceDirect[®]

Journals & Books



Register

Sign in



Renewable and Sustainable Energy Reviews

Supports open access

28.5

CiteScore

16.799

Impact Factor

Articles & Issues ▾

About ▾

Publish ▾

Order journal ↗

< Search in this journal



| Advanced Search

Latest issue

Volume 181

In progress

July 2023

About the journal

The mission of *Renewable and Sustainable Energy Reviews* is to communicate the most interesting and relevant critical thinking in **renewable and sustainable energy** in order to bring together the research community, the private sector and policy and decision makers. The aim of the journal is to share ...

[View full aims & scope](#)



Find articles with these terms

A review of demand response in smart grid



Journal or book title: Renewable and Sustainable Energy Reviews ✕

Advanced search

1,183 results

sorted by *relevance* | [date](#)

Refine by:

Years

☐ 2023 (44)

☐ 2022 (156)

☐ 2021 (154)

Show more ▾

Article type ?

☐ Review articles (979)

☐ Research articles (191)

☐ Correspondence (4)

☐ Discussion (1)

Show more ▾

Review article

A review of demand response deployment and its impact on smart grid programs with multiple aspects over smart grid platform

Renewable and Sustainable Energy Reviews, 14 April 2022 ...

Haider Tariq, Haider Tariq, Haider Tariq, Haider Tariq

Review article

A review of residential demand response programs in smart grid

Renewable and Sustainable Energy Reviews, June 2022 ...

Haider Tariq, Haider Tariq, Haider Tariq, Haider Tariq

Want a richer search experience?

Sign in for article previews, additional search fields & filters, and multiple article download & export options.

Sign in...

Citations



[1] Darby, S. (2006). The effectiveness of feedback on energy consumption: A review for DEFRA of the literature on metering, billing and direct displays. Environmental Change Institute, University of Oxford.

[2] Faruqui, A., Sergici, S., & Sharif, A. (2010). The impact of informational feedback on energy consumption—A survey of the experimental evidence. *Energy*, 35(4), 1598-1608.

[3] Li, H., Xu, Z., Sun, W., Wang, Y., & Zhang, J. (2015). A review of demand response in smart grid. *Renewable and Sustainable Energy Reviews*, 44, 569-582.

[4] Kwon, H. J., & Chae, Y. M. (2011). A new mechanism for energy management in a smart grid environment. *Journal of Intelligent and Humanized Computing*, 8(2), 247-256.

[5] Hong, T., Yan, D., & D'Oca, M. (2018). Machine learning algorithms for predicting building energy consumption: A review and comparative analysis. *Applied Energy*, 194, 135-162.

[5] Hong, T., Yan, D., & **D'Oca, S.** (2017). Machine learning algorithms for predicting building energy consumption: A review and comparative analysis. *Applied Energy*, 194, 135-162.







Simona D'Oca
Huygen Engineers and Consultants
Verified email at huygen.net
[building energy efficiency](#) [deep retrofit](#) [H2020 projects](#) [renovation](#) [NZEB](#)

[FOLLOW](#)

TITLE	CITED BY	YEAR
Advances in research and applications of energy-related occupant behavior in buildings T Hong, SC Taylor-Lange, S D'Oca, D Yan, SP Corgnati Energy and buildings 116, 694-702	541	2016
Ten questions concerning occupant behavior in buildings: The big picture T Hong, D Yan, S D'Oca, C Chen Building and Environment 114, 518-530	459	2017
An ontology to represent energy-related occupant behavior in buildings. Part I: Introduction to the DNAs framework T Hong, S D'Oca, WJN Turner, SC Taylor-Lange Building and Environment 92, 764-777	371	2015
IEA EBC Annex 66: Definition and simulation of occupant behavior in buildings D Yan, T Hong, B Dong, A Mahdavi, S D'Oca, I Gaetani, X Feng Energy and Buildings 156, 258-270	368	2017

Overview

- Do not trust AI content
- Structure is decent
- Needs to be extended
- Needs better story



Current Regulations



“Only use these technologies to improve readability and language, not to replace key researcher tasks such as interpreting data or drawing scientific conclusions.”

“Apply the technology with human oversight and control, and carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased.”

“Not list AI and AI-assisted technologies as an author or co-author, or cite AI as an author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans.”

“Disclose in the manuscript the use of AI and AI-assisted technologies in the writing process. [...] Authors are ultimately responsible and accountable for the contents of the work.”

“Basic word processing systems that recommend and insert replacement text or perform spelling or grammar checks and corrections are to be considered exceptions. ”

“Failure to do so may be treated as plagiarism ”

Questions with no answers (yet)

- Where/how to draw the line between editing and creating?
- Will student learn how to write? Will student learn?
- Where is the line between editing and writing?
- What should Editors and Reviewers do when a paper has been edited with AI software?
- Will our review system be able to detect AI-generated papers?

Thank you!

thank you!

