











Editorial Article

ChatGPT in Waste Management: Is it a Profitable

Thaeer Mueen Sahib^{1,2,*} , Hussain A. Younis^{3,4} , Osamah Mohammed Alyasiri^{3,5} , Ahmed Hussein Ali⁶ ,
Sani Salisu^{3,7} , Ameen A. Noore^{3,8} , Israa M. Hayder⁹ , Misbah Shahid¹⁰ 

¹*School of Electrical and Electronic Engineering, Universiti Sains Malaysia, Penang 14300, Malaysia*

²*Kufa Technical Institute, Al-Furat Al-Awsat Technical University, Kufa 540011, Iraq*

³*School of Computer Sciences, Universiti Sains Malaysia, Penang 11800, Malaysia*

⁴*College of Education for Women, University of Basrah, Basrah 61004, Iraq*

⁵*Karbala Technical Institute, Al-Furat Al-Awsat Technical University, Karbala 56001, Iraq*

⁶*Department of Computer, College of Education, AL-Iraqia University, Baghdad, Iraq*

⁷*Department of Information Technology, Federal University Dutse, Dutse720101, Nigeria*

⁸*Computer Science Department, College of Education, University of Al-Mustansirya, Baghdad 10045, Iraq*

⁹*Qurna Technique Institute, Southern Technical University, Basrah 61016, Iraq*

¹⁰*Department of English, University of Kotli Azad Jammu and Kashmir, Pakistan*

The first research topic is about waste management to reduce costs to provide a healthy environment for people. Investigating the topic and presenting it as the focus of the research was our interest in terms of minimization of the cost. During the research, there are a lot of topics related to that, many studies focused on different stages in waste management, the important one was the waste collection by utilizing artificial intelligence (AI). Before evaluating the reliability of ChatGPT's answers, it is necessary to provide a foundation for this sophisticated field management system [1] the history of solid waste management system first appeared in London in the late 18th century by Sir Edwin Chadwick.

However, waste management consists of different stages including collection, transport, treatment, and disposal according to numerous studies [2]. In terms of verifying from latter statement, the diagnosis of the waste collection stage takes around in our mind, a complex field with a significant amount of historical context. This came during our diving into the heart of the study area and contacting many researchers, they have provided us with many references [3-6] it became clear, after reading and checking, that it focused on studying the cost reduction of waste transportation by employing artificial intelligence algorithms to search for the best paths in waste collection. Other studies focused on waste management concerning the collection of solid waste using traditional control as presented by [7][8]. Therefore, becomes a big challenge way of choosing the knowledge in a fast way. According to that, in November 2022, Programmer experts launched a qualitative breakthrough to obtain knowledge at breakneck speed via utilizing a strong tool to solve many application problems in life, this tool is called a ChatGPT-3. That is a short foray into the history of ChatGPT. Its popularity has grown rapidly, and it has become a useful tool that works alongside social media programs such as Instagram, the TikTok platform, and many others. Here, a significant question took around in the minds. Consequently, In February 2023, it boasts 100 million monthly users, a landmark that took TikTok 9 months and Instagram 2.5 years to achieve. It is here to stay, and it is important to understand it. ChatGPT-3 is an open-source artificial intelligence technology that is understood as a large

*Corresponding author. Email: Kin.thr@atu.edu.iq

language model. Despite the power of this tool, there were concerns about its reliability. At this moment, we, as a research team, relied on verifying the accuracy of ChatGPT responses by comparing them and ensuring their acceptability with the results of traditional research in addition to the waste management experts.

First, we asked ChatGPT, to describe the history of waste management stages to us. It provided accurate information and that was correct. Second, it suggested some information by direct feedback about several types of waste, which were listed as liquid waste (sewage) some of them require specialized treatment. As well as dangerous waste (involving chemicals and toxins) that need special disposal procedures to avoid environmental contamination, but that information was not accurate enough, because it does not mention electrical waste and electronic equipment symbolizes it as E-waste (such as a personal computer, motherboards for many devices, micro-chips and more). Which greatly affects the destruction of the ecosystem because it contains radiation that is harmful to humans and corrupts the scene of cities [9]. It continued its discussion, citing that address the Waste Collection is a subtype of waste management. Although the information is correct, but needs further accuracy, For instance, waste collection has many classifications, according to a study carried out by [10] multiple depots for transferring the waste to transportation stations. Other studies confirmed the waste possible to transfer to multiple transportation stations and inhomogeneous vehicles under time windows for Municipal Solid Waste (MSW) [11]. Additional to the benefit of having read three books related to the same topic. Indeed, we were comfortable challenging ChatGPT, we asked " What is the path of improvement in waste management?" Its accurate summary as a unique key component of path improvement is route optimization for waste collection vehicles. Utilizing cutting-edge AI technology. ChatGPT offered a cohesive response that was concise and accurate. This tool's power is immense, and it is always being enhanced. In Mid-March 2023 saw the launch of ChatGPT-4, a revised version.

It is also becoming more common; ChatGPT's corporation, OpenAI, made it feasible for developers to directly implement this technology into their mobile applications in early March 2023 [12-14].

Currently, ChatGPT's has become more popular in communities, such as for technical engineering students. They will be used safely to drive learning and answering technical challenges. This technology is already being incorporated into the mobile applications that all are used on daily life. As citizens of the engineering community, we can observe the special concern among our team members regarding a solution that would solve our engineering problem while keeping up with our fast-paced surroundings, regardless of the firm or job interest. The accuracy of ChatGPT's responses, then, is of paramount importance. This specific conversation is an example of its efficiency but also its inaccuracy. We as engineers tend to be change-averse and reluctant to embrace new technology, but our engagement in such things is crucial. It is important to consider how internet resources such as UpToDate provide learners with accurate and trustworthy information that can be quickly accessed. Large language models, such as ChatGPT, provide a huge opportunity to make learning information even more efficient and accessible. As a result, we should drive this process in learning rather than going far away.

Conflicts Of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Funding

None.

Acknowledgment

The authors would like to express their gratitude to the anonymous reviewers for the useful recommendations and constructive remarks provided.

References

- [1] Costas A. Velis et al., “19th century London dust-yards: A case study in closed-loop resource efficiency,” *Waste Manag.*, p. *Waste Manag.*, 2009.
- [2] H. Feng, X. Wang, J. Cai, and S. Chen, “Discrepancies in N₂O emissions between household waste and its food waste and non-food waste components during the predisposal stage,” *J. Environ. Manage.*, vol. 265, no. December 2019, p. 110548, 2020, doi: 10.1016/j.jenvman.2020.110548.
- [3] Sahib et al., “Survey on Meta-Heuristic Algorithms for Solving Vehicle Route Problems in a Waste Collection System,” *Lect. Notes Electr. Eng.*, vol. 829, pp. 0–13, 2022, doi: https://doi.org/10.1007/978-981-16-8129-5_57.
- [4] M. A. Hannan, M. Akhtar, R. A. Begum, H. Basri, A. Hussain, and E. Scavino, “Capacitated vehicle-routing problem model for scheduled solid waste collection and route optimization using PSO algorithm,” *Waste Manag.*, vol. 71, pp. 31–41, 2018, doi: 10.1016/j.wasman.2017.10.019.
- [5] T. P. B. Vecchi et al., “A sequential approach for the optimization of truck routes for solid waste collection,” *Process Saf. Environ. Prot.*, vol. 102, pp. 238–250, 2016, doi: 10.1016/j.psep.2016.03.014.
- [6] H. L. Ao, T. N. Thoi, V. H. Huu, L. Anh-Le, T. T. Nguyen, and M. Q. Chau, “Backtracking search optimization algorithm and its application to roller bearing fault diagnosis,” *Int. J. Acoust. Vib.*, vol. 21, no. 4, pp. 445–452, 2016, doi: 10.20855/ijav.2016.21.4439.
- [7] S. Dugdhe, P. Shelar, S. Jire, and A. Apte, “Efficient waste collection system,” 2016 *Int. Conf. Internet Things Appl. IOTA 2016*, pp. 143–147, 2016, doi: 10.1109/IOTA.2016.7562711.
- [8] Sahib et al., “An Improved Strategy for Solid Waste Management based on Programmable Logic Controller,” *Int. J. Environ. Waste Manag.*, 2023, doi: <https://doi.org/10.1504/ijewm.2023.10048103>.
- [9] Soudabeh Pouyamanesh et al., “A review of various strategies in e-waste management in line with circular economics,” *Environ. Sci. Pollut. Res.*, no. 30, pp. 93462–93490, 2023.
- [10] D. Gulczynski, B. Golden, and E. Wasil, “The multi-depot split delivery vehicle routing problem: An integer programming-based heuristic, new test problems, and computational results,” *Comput. Ind. Eng.*, vol. 61, no. 3, pp. 794–804, 2011, doi: 10.1016/j.cie.2011.05.012.
- [11] Son et al., “Modeling municipal solid waste collection : A generalized vehicle routing model with multiple transfer stations , gather sites and inhomogeneous vehicles in time windows,” *Waste Manag.*, vol. 52, pp. 34–49, 2016, doi: 10.1016/j.wasman.2016.03.041.
- [12] Natalie, “What is ChatGPT?,” 2023. <https://help.openai.com/en/articles/6783457-what-is-chatgpt>
- [13] Thaeer Mueen Sahib et al., “A comparison between ChatGPT-3.5 and ChatGPT-4.0 as a tool for paraphrasing an English,” *ParagraphsInternational Appl. Soc. Sci.*, 2023.
- [14] Mohammed O, Sahib TM, Hayder IM, Salisu S, Shahid M. ChatGPT Evaluation: Can It Replace Grammarly and Quillbot Tools?. *British Journal of Applied Linguistics*. 2023 Oct 20;3(2):34-46.