Literature Review: Using Machine Learning for Smarter Restaurant HVAC Control

Introduction

This project looks at using machine learning (ML) to optimize a control system (eg-: HVAC systems in restaurants). Normally, HVAC systems react to temperature and occupancy changes. Instead, this idea uses ML to predict things like busy times or weather changes before they happen, so the HVAC can adjust early. This could save energy and keep customers comfortable.

Body

One study (Esrafilian-Najafabadi & Haghighat, 2021) used deep learning to control HVAC in homes. Their system predicted when people would be home and adjusted the temperature accordingly. While this worked well for houses, restaurants have much more unpredictable crowds. Also, their system only planned ahead rather than making instant adjustments.

Another review (Dev et al., 2021) looked at how ML improves control systems like HVAC. They found ML is great for analyzing energy use and finding problems, but rarely used for real-time control. Most systems just study data instead of making quick changes when needed.

Conclusion

While ML has been used in HVAC systems for predicting energy use and detecting faults, it hasn't been integrated directly into control systems for real-time adjustments. This project proposes a new approach where ML predicts disturbances (like customer numbers or weather changes) and helps adjust HVAC settings dynamically. This could lead to better energy efficiency, improved comfort, and smarter automation for restaurants.

Reference:

1. Esrafilian-Najafabadi, M. and Haghighat, F., 2021. Occupancy-based HVAC control using deep learning algorithms for estimating online preconditioning time in residential buildings. Energy and Buildings, 252, p.111377.

2. Dev, P., Jain, S., Arora, P.K. and Kumar, H., 2021. Machine learning and its impact on control systems: A review. Materials Today: Proceedings, 47, pp.3744-3749.