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## **Module 4**

For this project, I chose the A\* search method to calculate the lowest cost trade route from overseas factories to a U.S. warehouse. A\* is a complete search method, meaning it will always find a solution if one exists, and it is also admissible since the heuristic (straight-line distance multiplied by the lowest per-kilometer rate) never overestimates the true cost. The algorithm uses an evaluation function combining the actual path cost with the heuristic estimate, which balances efficiency and accuracy. While A\* is not the most space-efficient method because it keeps nodes in memory, its advantages outweigh this drawback for the relatively small problem space in my use case. It is well suited to trade route optimization since it accounts for both path costs (shipping distance and tariffs) and estimated remaining costs, allowing the model to avoid expensive detours. Similar methods are often applied in logistics and transportation planning, making A\* a logical choice for this scenario (SimpleAI, 2018; Alzubaidi et al., 2021; Sharda et al., 2023).

Alzubaidi, L., Zhang, J., Humaidi, A. J., Al-Dujaili, A., Duan, Y., Al-Shamma, O., & Farhan, L. (2021). Review of deep learning: Concepts, CNN architectures, challenges, applications, future directions. *Journal of Big Data, 8*(1), 53. [https://doi.org/10.1186/s40537-021-00444-8](https://doi.org/10.1186/s40537-021-00444-8?utm_source=chatgpt.com)

Sharda, R., Delen, D., & Turban, E. (2023). *Business intelligence, analytics, data science, and AI: A managerial perspective* (5th ed.). Pearson.

SimpleAI 0.8.2. (2018). *Python Package Index*. [https://pypi.org/project/simpleai/](https://pypi.org/project/simpleai/?utm_source=chatgpt.com)