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Capiter DS Assessment Report

Q1:

Assuming that we can sort the items in the warehouse by some features, let's choose the demand of the item on a scale of 1 to 10. We can design the warehouse as separate 3D racks, dividing each layer by the items category. Then, we can sort the items in each layer by its demand score, setting the highest score items in the corners, decreasing score while moving towards the layer center. This will result in log(n) search for the items.

Q2:

Data can play a key role in warehouse operations and inventory management. As shippers, logistics, and supply chain systems are deriving their insights from data systems, we can start applying such use cases for any system globally.

1. ### Demand Forecasting:
   This problem encapsulates multiple variables, we'll focus on items demand for the current being. This should be a schedule-updated feature on a daily basis, to update the weights of items and categories demand. Additionally, we shall take seasonality into consideration, as it affects the purchasing behaviors dramatically.

2. ### Appointment Schedulers:
   This mainly interacts with routes optimization. But rather than interacting with static algorithms, an AI utilizes complex data points to recommend the best route at best time. This includes set of features related to other dimensions, like warehouse load, order complexity, and expected delay (e.g. because of traffic jams).

Q3:

Most importantly, the demand factor, which is a regularly updated numerical feature, that defines the current demand of an item. This will help thoroughly in the forecasting problem. Secondly, the expiration dates of food items, to add it as a weight in demand forecasting. As nearly expired items need to go outbound, and be prioritized in appointment schedulers. Finally, routes heuristics data, which is composed of detailed historical trip information associated with truck specs (gas consumption, max speed, etc…). This will assist the appointment schedulers to fully understand the trucks behavior and capabilities, thus make a thoughtful decision regarding trucks routing.