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Prioritizing order fulfillment to optimize delivery costs

Jeffrey Cuartero

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Prioritizing order fulfillment to optimize delivery costs

ABSTRACT

Online customer orders are typically fulfilled in the sequence received, e.g., in a first-in, first-out manner. However, such a fulfillment process may not optimize transportation and delivery costs. Techniques disclosed herein optimize fulfillment of online customer orders based on identified criteria and process these orders in a sequence determined by such criteria. For example, orders for same-day delivery are processed in sequence while next-day orders are fulfilled based on the rate structure of a carrier. This reduces the costs associated with next-day orders that are leftover due to inadequate fulfillment capacity and processed on the following day as more expensive same-day deliveries.

KEYWORDS

- same-day delivery
- next-day delivery
- prioritized fulfillment
- order fulfillment
- delivery costs

BACKGROUND

Online customer orders are typically processed for same-day delivery or next-day delivery, among other delivery time frames. A same-day order is an order that is picked, paid, and packed on the same day that it is supposed to go out for delivery. Same-day orders are processed typically in an earlier shift of the day, e.g., between 6:00 AM and 1:00 PM. A next-day order is an order that is picked, paid, and packed a day before it is supposed to go out for
delivery. Next-day orders are processed typically at a later shift of the day, e.g., between 1:00 PM and 10:00 PM. Next-day orders are typically cheaper to fulfill, since there is more time to optimize routes and dispatch such orders. Delivery of orders is often outsourced by the online retailer to different carriers. If thus outsourced, carriers typically offer a discount on next-day deliveries, reflecting their lower costs of next-day vis-à-vis same-day deliveries. Each carrier sets its rates and next-day discounts based on differing criteria; for example, a carrier may charge based on weight of package, while another may have a fixed charge per delivery.

If a retailer is unable to fulfill all of the pending orders in the next-day work order queue, then they are then processed the following morning. However, these “leftover” next-day orders that are processed a day later are charged at the more expensive same-day rate even though the order was placed by customers on the previous day.

**DESCRIPTION**

Techniques disclosed herein optimize costs of a retailer by reducing leftover next-day orders. This amounts to taking a fuller advantage of the next-day discount by processing a larger portion of orders for next-day delivery. In order to benefit from next-day orders/savings, order spillage from today’s next-day queue to tomorrow’s same-day queue is minimized. Also, the sequence of processing of next-day orders is not necessarily first in first out (FIFO); rather it matches the cost structure of delivery, e.g., the rate and discount schedule of the carriers.

There are several factors that contribute to order volume for a particular delivery window, including order placement time, fulfillment capacity and marketing promotions in place. For example, if a customer places an order for same-day delivery, the order has to be processed and delivered on that very day. In principle, fulfillment capacity can be increased by adding labor to
process more next-day orders; however, the costs of additional labor may offset savings accrued from reducing leftover next-day orders.

This disclosure addresses the problem of reducing costs associated with leftover next-day orders by changing the order-fulfillment logic and the sequence in which work is generated for fulfillment. Rather than processing orders in a FIFO manner, the order queue is optimized to reduce transportation and delivery costs. For example, if a carrier charges by the weight of an order, then the heaviest orders are processed first within the next-day window; in this manner, the number of pounds that are charged the cheaper next-day rate is maximized. As another example, if a carrier charges on a per-delivery basis, e.g., fixed charge per delivery regardless of weight or number of items within package, orders with fewer items, e.g., which are quicker to process, are processed first during the next-day window; in this manner, the number of orders charged the cheaper next-day rate is maximized. The sequence in which customer orders are processed is immaterial so long as the customer receives it on or before the promised delivery date.
Fig. 1: Process flow to determine sequence for processing orders

Fig. 1 illustrates a process to determine the sequence of order processing, per techniques of this disclosure. A customer order is received (102) and a determination made if it is due for delivery on the same day (104). For orders that are not same-day deliveries, an order processing criteria is determined (106) based on, for example, the carrier rate structure. Orders are fulfilled in a sequence based on the determined criteria (108). Orders that are same-day deliveries are
processed in a sequence (110) to meet the same-day delivery deadline. After processing the order, delivery instructions are sent to the corresponding carrier (112).

*Examples*

**Example 1**

An online retailer engages carrier ABC to deliver its goods. Carrier ABC charges on a per-delivery basis that is independent of the weight of the package or the number of items therein. The retailer has a fulfillment capacity of at most 250 items per day. On a certain day, the next-day queue has 500 items, of which there are 249 orders comprising one item each and one order comprising 251 items. Since the carrier charges on a per-delivery basis, number of items per order notwithstanding, the retailer first processes the smallest orders (orders with fewest items), that is, the 249 orders with one item each. In this manner, the number of leftover next-day order is minimized to just the one order comprising 251 items. The next-day delivery discount received by the retailer from the carrier is applied to as many as 249 orders and is thereby maximized.

**Example 2**

An online retailer engages carrier XYZ to deliver its goods. Carrier XYZ charges by the weight of an order. As each item takes roughly the same amount of fulfillment capacity to process, the retailer reserves and prioritizes next-day fulfillment capacity towards pending orders with the highest weight per order. By doing so, the retailer minimizes the weight of leftover next-day orders. In this manner, the number of pounds that qualify for the cheaper next-day rate is maximized.

In contrast to current industry practices that process orders in a FIFO manner, techniques disclosed herein increase the number of orders that qualify for the cheaper next-day rate.
Moreover, the resulting savings are unaccompanied by cost, e.g., savings are accrued without an increase in order fulfillment capacity or labor hours.

Although the above description refers to an example involving same-day and next-day deliveries, the disclosed techniques may be applied to situations involving different types of delivery dates or time periods. In these situations, the order queue is optimized to deliver as many orders as possible on the furthest possible date, followed by deliveries on the day before, and so on, up to same day delivery.

CONCLUSION

This disclosure describes techniques to optimize transportation and delivery costs associated with online customer orders. Costs are optimized by determining relevant criteria such as the carrier rate and discount structure, and fulfilling orders based on such criteria. Considering orders due for delivery on the same day and on the next day, the order queue is optimized to increase number of orders delivered under cheaper next-day rates. In this manner, leftover next-day orders that are processed as more expensive same-day deliveries on the following day are reduced.