

Claims

What is claimed is:

1. A computer-implemented system for batch picking optimization, the system comprising:
 - one or more memory devices storing instructions; and
 - one or more processors configured to execute the instructions to:
 - receive an order comprising one or more items for picking;
 - calculate one or more high density areas in a fulfillment center by:
 - calculating distances between a first item in the one or more items and at least one other item in the one or more items using a search algorithm,
 - calculating nearest neighboring items for the one or more items,
 - and
 - generating a high density area by choosing a plurality of the nearest neighboring items;
 - store, for the one or more items, a distance between the item and a closest second item;
 - create a batch based on the calculated one or more high density areas;
 - add items from the one or more high density areas into the batch using a gradient descent algorithm, the adding based on an item increasing an average distance least among pickable items; and
 - provide a list of items for gathering in the batch and a location to a user device for display.

2. The system of claim 1, wherein the high density areas are calculated based on optimizing choosing of the nearest neighboring items to incur minimal travel distance.
3. The system of claim 1, wherein the gradient descent algorithm comprises finding the centroid of an area and the items are added based on being nearest to the centroid of the area.
4. The system of claim 3, wherein the gradient descent algorithm uses a digital map to determine an exchange of items that will increase a quality of the batch.
5. The system of claim 1, wherein:
the user device is one of a PDA, a smart phone, a tablet, a laptop, or other computer device; and
wherein the system further comprises a database comprising at least one record associating the user device with a user identifier.
6. The system of claim 1, wherein choosing the plurality of the nearest neighboring items comprises choosing three nearest neighboring items.
7. The system of claim 1, wherein the items in the batch for gathering include a package identifier associated with a Stock Keeping Unit (SKU) for display on the user device.

8. The system of claim 1, wherein calculating distances between items

comprises:

retrieving a digital map comprising location pairs, each pair representing two pickable items; and

calculating distances between items using a plurality of the retrieved location pairs.

9. A computer-implemented system for batch picking optimization, the system comprising:

one or more memory devices storing instructions; and

one or more processors configured to execute the instructions to:

receive an order comprising one or more items for picking and a digital map segmented into multiple zones;

calculate one or more high density areas in a fulfillment center by:

calculating distances between a first item in the one or more items and at least one other item in the one or more items using a search algorithm in a single zone,

calculating nearest neighboring items for the one or more items, and

generating a high density area by choosing a plurality of the nearest neighboring items;

store, for the one or more items, a distance between the item and a closest second item;

create a batch based on the calculated one or more high density areas from items in the single zone;

add items from the one or more high density areas into the batch using a gradient descent algorithm, the adding based on an item increasing an average distance least among pickable items; and
provide a list of items for gathering in the batch and a location on a user device for display.

10. The system of claim 9, wherein the high density areas are calculated based on optimizing choosing of the nearest neighboring items to incur minimal travel distance.

11. The system of claim 9, wherein the gradient descent algorithm comprises finding the centroid of an area and the items are added based on being nearest to the centroid of the area.

12. The system of claim 11, wherein the gradient descent algorithm uses the digital map to determine an exchange of items that will increase a quality of the batch.

13. The system of claim 9, wherein the user device is one of a PDA, a smart phone, a tablet, a laptop, or other computer device; and
wherein the system further comprises a database comprising at least one record associating the user device with a user identifier.

14. The system of claim 9, wherein choosing the plurality of the nearest neighboring items is three nearest neighboring items.

15. The system of claim 9, wherein items in the batch include a barcode associated with the Stock Keeping Units (SKUs) provided in the list of items for gathering in the batch on the user device for display.

16. The system of claim 9, wherein the digital map comprises location pairs, each pair representing two pickable items.

17. A computer-implemented method for batch picking optimization, the method comprising:

- receiving an order comprising one or more items for picking and a digital map segmented into multiple zones, wherein the digital map comprises location pairs, each pair representing two pickable items;

- calculating one or more high density areas in a fulfillment center by:

- calculating distances between a first item in the one or more items and at least one other item in the one or more items using a search algorithm in a single zone, by comparing a plurality of the received location pairs,

- calculating nearest neighboring items for the one or more items,

- and

- generating a high density area by choosing a plurality of the nearest neighboring items;

- storing, for the one or more items, a distance between the item and a closest second item;

creating a batch based on the calculated one or more high density areas from items in the single zone;

adding items from the one or more high density areas into the batch using a gradient descent algorithm, the adding based on an item increasing an average distance least among pickable items; and

providing a list of items for gathering in the batch and a location on a user device for display.

18. The system of claim 17, wherein the high density areas are calculated based on optimizing choosing of the nearest neighboring items to incur minimal travel distance.

19. The system of claim 17, wherein the gradient descent algorithm comprises finding the centroid of an area and the items are added based on being nearest to the centroid of the area.

20. The system of claim 19, wherein the gradient descent algorithm uses the digital map to determine an exchange of items that will increase a quality of the batch.