

Claims

1. A computerized system for item correlation, comprising:
 - at least one processor; and
 - at least one non transitory storage medium comprising instructions that, when executed by the at least one processor, cause the at least one processor to perform steps comprising:
 - receiving an indication of an order comprising at least one item;
 - determining if the order is urgent based on an amount of time remaining until the items must ship to a customer;
 - determining a location of each of a plurality of pickers;
 - iteratively, for items in the order:
 - identifying a picker closest to the item, the picker having a current job priority;
 - correlating the closest picker and the item in a data structure;
 - re-correlating, in the data structure, at least one mutable item previously correlated with the closest picker to an alternate picker in response to the current job priority not being urgent, wherein items previously correlated with the closest picker are sequenced in the data structure according to respective correlation times, with a first N items of the sequence being fixed, a remaining M items being mutable, and a length of the sequence being limited to N+M items;
 - sending, to a user device of the closest picker, a location and item identifier associated with the item; and
 - storing, in the data structure, a completion flag in correlation with the item upon receipt of an item-complete message from the user device indicating that the item has been picked;
 - receiving a job-complete message from a user device of a picker among the plurality of pickers;
 - counting a number of items correlated to the picker that have the completion flag;

comparing the number of items to a success threshold to determine a failure; and

sending a signal to lock the user device of the picker when a number of failures exceeds a failure threshold.

2. The system of claim 1, wherein the success threshold is based on packaging requirements.
3. The system of claim 1, wherein identifying a picker closest to the item comprises:
selecting a second closest picker in response to a first closest picker having a sequence length of $N+M$.
4. The system of claim 1, wherein the item is a first item, and the steps further comprise:
determining a location of a second item of the order;
determining a distance between the second item and the first item; and
correlating the second item to the closest picker in response to the distance being less than a threshold.
5. The system of claim 4, wherein the threshold is determined by:
calculating a first cost based on shipping the first item and second item separately;
calculating a second shipping cost based on shipping the first item and second item together;
determining a difference between the first cost and the second cost;
calculating an amount of time based on the difference; and
setting the threshold to be a distance the closest picker travels during the amount of time.
6. The system of claim 1, wherein the steps further comprise:

- determining a number of items that have no picker correlation in the data structure;
- determining an average ratio of items per picker;
- re-correlating items and pickers, in response to the number exceeding a backlog threshold and the average ratio exceeding a tasking threshold, by:
 - calculating an item density of a plurality of areas;
 - calculating a picker density of the plurality of areas;
 - calculating an engagement ratio of item density to picker density for each of the plurality of areas;
 - selecting a reassignment picker from a first area having the lowest engagement ratio;
 - re-correlating, in the data structure, initial items from the reassignment picker to a separate picker in the first area;
 - re-correlating, in the data structure, reassigned items from pickers in a second area having the highest engagement ratio; and
 - sending, to a user device of the reassignment picker, locations and item identifiers associated with the re-correlated items.

7. The system of claim 6, wherein the re-correlating occurs on regular time intervals.

8. The system of claim 1, wherein the steps further comprise:

- determining if the order is normal priority based on an amount of time remaining until the items must ship to the customer; and

- iteratively, for pending items in the order, and in response to the order being normal priority:

- identifying a location of the pending item;

- identifying a plurality of near pickers within a threshold distance to the location;

- iteratively, for each of the near pickers:

determining locations of previously-correlated items of the near picker;

setting a queue distance of the near picker as a distance between the near picker and a closest previously-correlated item of the near picker;

correlating the pending item to a near picker having the smallest queue distance.

9. A computer-implemented method for item correlation, comprising:
receiving an indication of an order comprising at least one item;
determining if the order is urgent based on an amount of time remaining until the items must ship to a customer;

determining a location of each of a plurality of pickers;
iteratively, for items in the order:

identifying a picker closest to the item, the picker having a current job priority;

correlating the closest picker and the item in a data structure;
re-correlating, in the data structure, at least one mutable item previously correlated with the closest picker to an alternate picker in response to the current job priority not being urgent, wherein items previously correlated with the closest picker are sequenced in the data structure according to respective correlation times, with a first N items of the sequence being fixed, a remaining M items being mutable, and a length of the sequence being limited to N+M items;

sending, to a user device of the closest picker, a location and item identifier associated with the item; and

storing, in the data structure, a completion flag in correlation with the item upon receipt of an item-complete message from the user device indicating that the item has been picked;

receiving a job-complete message from a user device of a picker among the plurality of pickers;

counting a number of items correlated to the picker that have the completion flag;
comparing the number of items to a success threshold to determine a failure; and

sending a signal to lock the user device of the picker when a number of failures exceeds a failure threshold.

10. The computer-implemented method of claim 9, wherein the success threshold is based on packaging requirements.

11. The computer-implemented method of claim 9, wherein identifying a picker closest to the item comprises:

selecting a second closest picker in response to a first closest picker having a sequence length of $N+M$.

12. The computer-implemented method of claim 9, wherein the item is a first item, and the steps further comprise:

determining a location of a second item of the order;

determining a distance between the second item and the first item; and

correlating the second item to the closest picker in response to the distance being less than a threshold.

13. The computer-implemented method of claim 12, wherein the threshold is determined by:

calculating a first cost based on shipping the first item and second item separately;

calculating a second shipping cost based on shipping the first item and second item together;

determining a difference between the first cost and the second cost;

calculating an amount of time based on the difference; and

setting the threshold to be a distance the closest picker travels during the amount of time.

14. The computer-implemented method of claim 9, wherein the steps further comprise:

- determining a number of items that have no picker correlation in the data structure;
- determining an average ratio of items per picker;
- re-correlating items and pickers, in response to the number exceeding a backlog threshold and the average ratio exceeding a tasking threshold, by:
 - calculating an item density of a plurality of areas;
 - calculating a picker density of the plurality of areas;
 - calculating an engagement ratio of item density to picker density for each of the plurality of areas;
 - selecting a reassignment picker from a first area having the lowest engagement ratio;
 - re-correlating, in the data structure, initial items from the reassignment picker to a separate picker in the first area;
 - re-correlating, in the data structure, reassigned items from pickers in a second area having the highest engagement ratio; and
 - sending, to a user device of the reassignment picker, locations and item identifiers associated with the re-correlated items.

15. The computer-implemented method of claim 14, wherein the re-correlating occurs on regular time intervals.