

WHAT IS CLAIMED IS:

1. A computer-implemented system for multi-point destination arrival time analysis, the system comprising:
 - a memory storing instructions; and
 - at least one processor configured to execute the instructions to:
 - receive, from a first external system via a network, a plurality of durations associated with at least one orderable item and associated metadata, the durations based on past history of producing the orderable items;
 - store the plurality of durations associated with the at least one orderable item in a data store, the durations based on past history of producing the orderable items;
 - retrieve, from the data store, the stored plurality of durations associated with the at least one item;
 - feed the stored plurality of durations associated with the at least one orderable item and associated metadata to a machine learning algorithm;
 - receive, from a third external system via the network, a request for the at least one orderable item;
 - receive an estimated preparation time for the at least one orderable item;
 - determine a first estimated travel time based on a plurality of estimated travel times between the first external system and a plurality of delivery devices associated with potential delivery workers;
 - determine a first arrival estimate based on a second estimated travel time between the first external system and the third external system, and the greater of:
 - the estimated preparation time for the at least one orderable item or
 - the first estimated travel time;
 - forward the first arrival estimate to the third external system;

assign one of the potential delivery workers based on the estimated preparation time;
forward a request to a delivery device associated with the assigned delivery worker to fulfill a delivery of the at least one orderable item;
determine a second arrival estimate based on the first estimated travel time and the greater of:
the estimated preparation time for the at least one item, or
a third estimated travel time between the first external system and the delivery device associated with the assigned delivery worker; and
forward the second arrival estimate to the third external system.

2. The system of claim 1, wherein the associated metadata includes one or more of:
 - a day;
 - a time of day;
 - a customization;
 - an inventory of the at least one orderable item;
 - resources available at a merchant at a time of an order; or
 - a merchant-provided estimated preparation time.
3. The system of claim 1, wherein assigning one of the potential delivery workers comprises:
 - receiving, from signals transmitted by the plurality of delivery devices, locations associated with the plurality of delivery devices;
 - determining the assigned delivery worker based on:
 - at least one second estimated travel time; and
 - the estimated preparation time.
4. The system of claim 3, wherein assigning one of the potential delivery workers further comprises:

determining, for each of the plurality of estimated travel times associated with the plurality of delivery devices:

a first cost associated with the at least one second estimated travel time;

and

a second cost associated with a difference between the second estimated travel time and the estimated preparation time.

5. The system of claim 4, wherein assigning one of the potential delivery workers further comprises:
calculating, for each of the plurality of estimated travel times associated with the plurality of delivery devices, a sum of the first costs and the second costs;
comparing the sums associated with each of the plurality of estimated travel times associated with the plurality of delivery devices; and
determining the assigned delivery worker based on the comparison.
6. The system of claim 3, wherein the at least one processor is further configured to execute the instructions to calculate each of the plurality of estimated travel times by:
determining a straight-line distance between two locations;
selecting a constant speed; and
determining the estimated travel time along the straight-line distance at the selected constant speed.
7. The system of claim 1, wherein the at least one processor is further configured to execute the instructions to:
receive, from the delivery device of the assigned worker via the network,
an acceptance of the request to fulfill the delivery of the at least one orderable item.
8. The system of claim 1, wherein the at least one processor is further configured to execute the instructions to:

receive, from a merchant device or the delivery device of the assigned delivery worker, confirmation that the orderable item has been retrieved, and in response thereto

determine a third arrival estimate based on the first estimated travel time; and forward the third arrival estimate to the third external system.

9. A computer-implemented method performed by at least one processor for multi-point destination arrival time analysis, the computer-implemented method comprising:

receiving, from a first external system via a network, a plurality of durations

associated with at least one orderable item and associated metadata, the durations based on past history of producing the orderable items;

storing the plurality of durations associated with the at least one orderable item in a data store, the durations based on past history of producing the orderable items;

retrieving, from the data store, the stored plurality of durations associated with the at least one item;

feeding the stored plurality of durations associated with the at least one orderable item and associated metadata to a machine learning algorithm;

receiving, from a third external system via the network, a request for the at least one orderable item;

receiving an estimated preparation time for the at least one orderable item;

determining a first estimated travel time based on a plurality of estimated travel times between the first external system and a plurality of delivery devices associated with potential delivery workers;

determining a first arrival estimate based on a second estimated travel time between the first external system and the third external system, and the greater of:

the estimated preparation time for the at least one orderable item or the first estimated travel time;

forwarding the first arrival estimate to the third external system;

assigning one of the potential delivery workers based on the estimated preparation time;
 forwarding a request to a delivery device associated with the assigned delivery worker to fulfill a delivery of the at least one orderable item;
 determining a second arrival estimate based on the first estimated travel time and the greater of:
 the estimated preparation time for the at least one item, or
 a third estimated travel time between the first external system and the delivery device associated with the assigned delivery worker; and
 forwarding the second arrival estimate to the third external system.

10. The method of claim 9, wherein the associated metadata includes one or more of:

a day;
 a time of day;
 a customization;
 an inventory of the at least one orderable item;
 resources available at a merchant at a time of an order; or
 a merchant-provided estimated preparation time.

11. The method of claim 9, wherein assigning one of the potential delivery workers comprises:

receiving, from signals transmitted by the plurality of delivery devices, locations associated with the plurality of delivery devices; and
 determining the assigned second external system delivery worker based on:
 the second estimated travel time; and
 the estimated preparation time.

12. The method of claim 11, wherein assigning one of the potential delivery workers further comprises:

determining, for each of the plurality of estimated travel times associated with the plurality of delivery devices: a first cost associated with the at least one second estimated travel time; and
a second cost associated with a difference between the estimated second travel time and the estimated preparation time.

13. The method of claim 12, wherein assigning one of the potential delivery workers further comprises:
calculating, for each of the plurality of estimated travel times associated with the plurality of delivery devices, a sum of the first costs and the second costs
comparing the sums associated with each of the plurality of estimated travel times associated with the plurality of delivery devices; and
determining the assigned delivery worker based on the comparison.
14. The method of claim 11, further comprising calculating each of the plurality of estimated travel times by:
determining a straight-line distance between two locations;
selecting a constant speed; and
determining the estimated travel time along the straight-line distance at the selected constant speed.
15. The method of claim 9, further comprising:
receiving, from the delivery device of the assigned worker via the network, an acceptance of the request to fulfill the delivery of the at least one orderable item.
16. The method of claim 9, further comprising:
receiving, from a merchant device of the assigned delivery worker, confirmation that the orderable item has been retrieved, and in response thereto;
determining a third arrival estimate based on the first estimated travel time; and
forwarding the third arrival estimate to the third external system.

17. A computer-implemented system for multi-point destination arrival time analysis, the system comprising:
 - a memory storing instructions; and
 - at least one processor configured to execute the instructions to:
 - receive, from a merchant device via a network, a plurality of durations associated with at least one orderable item and associated metadata, the durations based on past history of producing the orderable items;
 - store the plurality of durations associated with at least one orderable item in a data store, the durations based on past history of producing the orderable items;
 - retrieve, from the data store, the stored plurality of durations associated with the at least one item;
 - feed the stored plurality of durations associated with the at least one item and associated metadata to a machine learning algorithm;
 - receive, from a third external system via the network, a request for at least one orderable item;
 - receive an estimated preparation time for the at least one orderable item;
 - determine a first estimated travel time based on a plurality of estimated travel times between the merchant device and a plurality of delivery devices associated with potential delivery workers; and
 - determine a first arrival estimate based on a second estimated travel time between the merchant device and the third external system, and the greater of:
 - the estimated preparation time for the at least one orderable item or
 - the first estimated travel time;
 - forward the first arrival estimate to the third external system;
 - assign one of the potential delivery workers based on the estimated preparation time;

forward a request to a delivery device associated with the assigned delivery worker to fulfill a delivery of the at least one orderable item;
 receive, from the delivery device of the assigned delivery worker via the network, an acceptance of the request to fulfill the delivery of the at least one orderable item, and in response thereto:
 determine a second arrival estimate based on first estimated travel time, and the greater of:
 the estimated preparation time for the at least one item, or
 a third estimated travel time between the merchant device and the delivery device associated with the assigned delivery worker; and
 forward the second arrival estimate to the third external system.

18. The system of claim 17, wherein the instructions further comprise:
 receiving, from signals transmitted by the plurality of delivery devices, locations associated with the plurality of delivery devices;
 determining, for each of the plurality of estimated travel times associated with the plurality of delivery devices:
 a first cost associated with the estimated travel time; and
 a second cost associated with the difference between the estimated travel time and the estimated preparation time;
 calculating, for each of the plurality of estimated travel times associated with the plurality of delivery devices, a sum of the first costs and the second costs
 comparing the sums associated with each of the plurality of estimated travel times associated with the plurality of delivery devices; and
 determining an assigned delivery worker based on the comparison.