System and Method for Driver Selection

Technical Field

[0001] The present invention relates to a system and method for selection in on-demand services. For example, the present invention relates to a method for driver selection performed by a computing system.

Background

[0002] On-demand services exist to arrange transport services for a user to be provided by a driver. In providing on-demand transportation services, for example, it can be difficult to match passengers with an available taxi. At times, there may be multiple available taxis and only one passenger requesting a taxi, and many of the available taxi drivers will not receive the job. When a passenger makes a booking request for a taxi, the booking request is typically broadcast to many drivers as a job request. The drivers are expected to either accept, decline or ignore the job request. The drivers would then have to "bid" for the booking (i.e. accept the job request) if they wish to take up the booking, but only one of the many bidding drivers will actually be assigned the job. Therefore, the chance of success of getting the job may be relatively low. Drivers that fail to get jobs may grow frustrated and stop participating in the on-demand service. Therefore, there remains a need to address these and other problems in existing on-demand services.

Summary

[0002a] Aspects of the invention are defined in the independent claims. Some optional features of the invention are defined in the dependent claims.

[0003] According to various embodiments, a method for multiple-round driver selection performed by a computing system, the method including: receiving a service request from a user device; identifying a plurality of driver candidates based in part on the service request, wherein each of the plurality of driver candidates has driver data; for each of the plurality of driver candidates, generating a score based on the driver data; grouping the plurality of driver candidates into a plurality of candidate groups based in part on the score of each of the plurality of driver candidates; iteratively transmitting a job request to each candidate group of the plurality of candidate groups until one or more job acceptance is received in response to

the job request, wherein the job request is transmitted to all drivers in each candidate group; selecting one of the one or more job acceptances; and assigning the service request to the driver associated with the selected one

of the one or more job acceptances may be provided. The multiple-round driver selection method operates so that job requests get sent to fewer drivers but in a more targeted way, thereby reducing competition among the drivers and increasing the probability that a driver is selected for a job request, also referred to as the win rate. In this way, the method improves the driver selection process and win rate of each driver.

[0004] According to various embodiments, the step of identifying the plurality of driver candidates may include: receiving driver activity data in real time for each of a plurality of drivers; monitoring the activity data for each of the plurality of drivers; and determining which of the plurality of drivers are available to accept a job request, wherein the plurality of driver candidates is a subset of the plurality of drivers. By selecting the plurality of driver candidates from the plurality of drivers based on the real time driver activity data, the system is able to target drivers who are most likely to accept the job request, so as to improve the probability of driver candidates accepting the job request.

[0005] According to various embodiments, the step of grouping the plurality of driver candidates into a plurality of candidate groups may include: determining a ranking of the plurality of driver candidates based in part on the score of each of the plurality of drivers; determining a number of candidate groups; assigning each of the plurality of driver candidates to one of the plurality of groups based on the ranking. By ranking and grouping the plurality of driver candidates, the job request can be sent to driver candidates who are more likely to accept the job request, thereby improving the job request selection rate.

[0006] According to various embodiments, the service request includes user location data identifying the geographic position of the user device, and the driver data includes driver location data identifying the geographic position of the driver, and wherein the method further comprises: generating a proximity score based on the user location data and the driver location data, wherein the score is generated based in part on the proximity score. By generating the proximity score, the system would be able to take into consideration the proximity between the driver candidates and the user when generating the driver score.

[0007] According to various embodiments, the method may further comprise: generating a starvation score based on the driver data, the starvation score based in part on a number of unsuccessful acceptances by a driver over a predetermined period of time, wherein the driver score is generated based in part on the starvation score. By generating the starvation score,

determining a number of candidate groups and dividing the total score by the number of candidate groups to obtain the group score.

[0014] According to various embodiments, the step of assigning the service request may include assigning the service request to the driver candidate having the highest starvation score.

[0015] According to various embodiments, a computing system for implementing a method of multiple-round driver selection, the computing system comprising: one or more processors; one or more memory resources in communication with the one or more processors, the one or more memory resources storing instructions that, when executed by the one or more processors, cause the computing system to: receive a service request from a user device; identify a plurality of driver candidates based in part on the service request, wherein each of the plurality of driver candidates has driver data; for each of the plurality of driver candidates, generate a score based on the driver data; group the plurality of driver candidates into a plurality of candidate groups based in part on the score of each of the plurality of driver candidates; iteratively transmit a job request to each candidate group of the plurality of candidate groups until one or more job acceptance is received in response to the job request, wherein the job request is transmitted to all drivers in each candidate group; select one of the one or more job acceptances; and assign the service request to the driver associated with the selected one of the one or more job acceptances may be provided.

[0016] According to various embodiments, the instructions may cause the computing system to identify the plurality of driver candidates by receiving driver activity data in real time for each of a plurality of drivers; monitor the activity data for each of the plurality of drivers; and determine which of the plurality of drivers are available to accept the job request, wherein the plurality of driver candidates is a subset of the plurality of drivers.

[0017] According to various embodiments, the instructions may cause the computing system to group the plurality of driver candidates into a plurality of candidate groups by determining a ranking of the plurality of driver candidates based in part on the score of each of the plurality of drivers; determining a number of candidate groups; and assigning each of the plurality of driver candidates to one of the plurality of groups based on the ranking.

[0025] According to various embodiments, the instructions may cause the computing system to determine the group score by summing the scores of the plurality of driver candidates to obtain a total score, determining a number of candidate groups and dividing the total score by the number of candidate groups to obtain the group score.

[0026] According to various embodiments, the instructions may cause the computing system to assign the service request by assigning the service request to the driver candidate having the highest starvation score.

Brief description of the drawings

[0027] Fig. 1 shows an example system for multiple-round driver selection.

[0028] Fig. 1A shows an example user device.

[0029] Fig. 1B shows an example driver device.

[0030] Fig. 2 shows a flow diagram of an example embodiment of a method for multiple-round driver selection.

[0031] Fig. 3 shows a flow diagram of an example embodiment of an iterative sub-process for multiple-round driver selection.

[0032] Fig. 4 shows an example score generating sub-system.

[0033] Fig. 5 shows a flow diagram of an example embodiment of a method for generating a score.

[0034] Fig. 6 is an illustration of an example prediction model of the multiple-round selection method.

Detailed Description

[0035] Embodiments may provide a multiple-round system and method for selecting service providers, although the driver selection may also be completed within a single round. Generally, an on-demand services system is used by both service requesters and services providers. In the described embodiments, the on-demand service being provided is transportation services, the service requester is a potential passenger in need of transportation services, such as a ride from his or her present location to an end destination, and the service providers are drivers, such as taxi drivers or

independent contractor drivers, that are in need of passengers. However, embodiments are not limited only to transportation services and may be used for other on-demand services.

[0036] Fig. 1 shows an example system 100 for multiple-round driver selection. System 100 includes a user device interface 130, a driver device interface 140, a driver selection sub-system 150, a driver availability determining component 152, a score generating component 154, a group generating component 156, and a service request processing component 158. System 100 can communicate with a user device 160 and a driver device 162 over a network 164. The user device 160 is used by a user, who may be a passenger, for example, and the driver device 162 is used by a driver of a vehicle, for example, or another provider of on-demand services. The user device interface 130 manages communications between the system 100 and the user device 160. The driver device interface 140 manages communications between the system 100 and the driver device 162. The driver selection sub-system 150 selects a plurality driver candidates in response to a request from the user device 160. Driver selection sub-system 150 may include a driver availability determining component 152, a driver score generating component 154, a group generating component 156, and a service request processing component 158. System 100 may be implemented to broadcast the job request to the plurality of driver candidates.

[0037] One or more of the components and sub-systems of the system 100 can be implemented on network side resources, such as one or more servers having one or more processors and in communication with one or more memory resources. The system 100 can also be implemented through other computing systems in any other suitable alternative, or complementary, architectures, such as peer-to-peer networks. As an addition or alternative to these implementations, some or all of the components and sub-systems of the system 100 can be implemented on client devices, such as through applications that operate on the user device 160 and/or the driver device 162. The system can communicate over the network 164 by way of a network interface, such as wireless or wired network devices and protocols, to communicate with one or more user devices 160 and one or more driver devices 162. According to one implementation, the user device 160 and the driver device 162 each includes one or more processors and operates an application that can manage communications between the respective device and the user device interface 130 and the driver device interface 140, respectively. The system can also communicate with one or more

though they have accepted many job requests. A certain service request may not be assigned due to a low acceptance probability score 414 and/or a low proximity score 418 over a pre-determined period of time. The starvation score 420 of a driver would increase as the duration of time that the driver is not assigned a service request increases.

[0052] Fig. 5 shows a flow diagram for an example method 500 for generating the driver score 412 (Fig. 4). The method 500 may be performed by the system 100 (Fig. 1) and the driver score generating sub-system 400 (Fig. 4). In method 500, the system 100 generates an acceptance probability score based on the driver data 408 (502). System 100 generates a proximity score for each of the plurality of driver candidates based on the driver data 408 and service request 410 (504). The system 100 generates a starvation score based on the driver data 408 (506). System 100 generates the driver score 412 based on at least one of: the acceptance probability score; the proximity score; and the starvation score.

[0053] When determining a ranking of the plurality of driver candidates, the system 100 may add a starvation weight to one or more of the plurality of driver candidate. Starvation weight may be based in part of the starvation score. Starvation weight may increase the ranking of the one or more plurality of driver candidates.

[0054] System 100 may wait for a pre-determined amount of time for the driver candidates in a candidate group to accept the job request that has been transmitted to the candidate group. If no response is received from driver candidates in the candidate group after waiting the predetermined amount of time, the system 100 may transmit the job request to the subsequent candidate group.

[0055] Fig. 6 is an illustration of an example prediction model of the multiple-round selection method. In the illustrated prediction model, a plurality of driver candidates are grouped into a first group 902, a second group 904, a third group 906, a fourth group 908, and a fifth group 910. The prediction model estimates that each group will include accepting drivers 912 that accept the job request and unresponsive drivers 914 that either reject the job request or do not respond to the job request. Accepting drivers 912 are indicated by a round "check" image, and unresponsive drivers 914 are indicated by a square "x" image. The illustration of Fig. 6 shows what example groups would look like. In an example first group 902, the job request is sent to a total of three driver candidates, and there are two accepting drivers 912. One of the two accepting drivers will be assigned the job.

CLAIMS

1. A method for driver selection performed by a computing system, the method comprising:

receiving a service request from a user device;

identifying a plurality of driver candidates based in part on the service request, wherein each of the plurality of driver candidates has driver data;

for each of the plurality of driver candidates, generating a score based on the driver data;

grouping the plurality of driver candidates into a plurality of candidate groups based in part on the score of each of the plurality of driver candidates, the plurality of candidate groups comprising a first candidate group, a second candidate group and a last candidate group; wherein:

the plurality of driver candidates is grouped into the plurality of candidate groups such that a first number of driver candidates in the first candidate group is less than a second number of driver candidates in the second candidate group and the second number of driver candidates in the second group is less than a last number of driver candidates in the last candidate group;

the first candidate group has a corresponding first candidate group score, the second candidate group has a corresponding second candidate group score and the last candidate group has a corresponding last candidate group score; and

the first candidate group score, the second candidate group score and the last candidate group score are approximately the same;

transmitting a job request to at least a subset of driver devices of driver candidates in the first candidate group;

responsive to a determination that the job request has been accepted by at least one driver candidate in the first candidate group, assigning the service request to one of the driver candidates in the first candidate group that accepted the job request;

responsive to a determination that the job request has not been accepted by any driver candidates in the first candidate group, transmitting a job request to at least a subset of driver devices of the driver candidates in the second candidate group and, if the job request is accepted by at least one driver candidate in the second candidate group, assigning the service request to one of the driver candidates in the second candidate group that accepted the job request, and if the job request is not accepted by any driver candidates in the second candidate

group, transmitting the job request to at least a subset of driver devices of the driver candidates in the last candidate group.

2. The method of claim 1, wherein identifying the plurality of driver candidates includes: receiving driver activity data in real time for each of a plurality of drivers; monitoring the driver activity data for each of the plurality of drivers; and determining which of the plurality of drivers are available to accept the job request, wherein the plurality of driver candidates is a subset of the plurality of drivers.

3. The method of claim 1 or 2, wherein grouping the plurality of driver candidates into a plurality of candidate groups includes: determining a ranking of the plurality of driver candidates based in part on the score of each of the plurality of driver candidates; determining a number of candidate groups; and assigning each of the plurality of driver candidates to one of the plurality of groups based on the ranking.

4. The method of any one of claims 1 to 3, wherein the service request includes user location data identifying a geographic position of the user device, and the driver data includes driver location data identifying a geographic position of the driver, and wherein the method further comprises: generating a proximity score based on the user location data and the driver location data, wherein the score is generated based in part on the proximity score.

5. The method of any one of claims 1 to 4, further comprising: generating a starvation score based on the driver data, the starvation score based in part on a number of unsuccessful acceptances by a driver over a predetermined period of time, wherein the score is generated based in part on the starvation score.

6. The method of claim 5, wherein determining a ranking of the plurality of driver candidates includes adding a starvation weight to one or more of the plurality of driver candidates, wherein the starvation weight is based in part of the starvation score, and the starvation weight increases the ranking of the one or more plurality of driver candidates.

7. The method of any one of claims 1 to 6, wherein transmitting the job request to driver devices of the second candidate group or the last candidate group of the plurality of candidate groups includes waiting a predetermined amount of time after transmitting the job request to driver devices of the first candidate group or the second candidate group respectively.

8. The method of any one of claims 1 to 7, wherein transmitting the job request includes transmitting the job request to driver devices of the first candidate group with the highest ranked plurality of driver candidates, wherein the sum of the scores of the highest ranked plurality of driver candidates is larger than or equal to the first candidate group score.

9. The method of any one of claims 1 to 8, wherein determining the first candidate group score, the second candidate group score and the last candidate group score comprises a corresponding sum of the scores of a plurality of driver candidates within the respective candidate groups.

10. The method of any one of claims 1 to 8, wherein determining the first candidate group score, the second candidate group score and the last candidate group score includes summing the scores of the plurality of driver candidates to obtain a total score, determining a number of candidate groups to be formed, and dividing the total score by the number of candidate groups to obtain each group score.

11. The method of any one of claims 6 to 10, wherein assigning the service request includes assigning the service request to the driver candidate having a highest starvation score.

12. A computing system for implementing a method of driver selection, the computing system comprising:

one or more processors;

one or more memory resources in communication with the one or more processors, the one or more memory resources storing instructions that, when executed by the one or more processors, cause the computing system to:

receive a service request from a user device:

identify a plurality of driver candidates based in part on the service request, wherein each of the plurality of driver candidates has driver data;

for each of the plurality of driver candidates, generate a score based on the driver data;

group the plurality of driver candidates into a plurality of candidate groups based in part on the score of each of the plurality of driver candidates, the plurality of candidate groups comprising a first candidate group, a second candidate group and a last candidate group; and

to group the plurality of driver candidates into the plurality of candidate groups such that a first number of driver candidates in the first candidate group is less than a second number of driver candidates in the second candidate group and the second number of driver candidates in the second group is less than a last number of driver candidates in the last candidate group; and to:

determine a first candidate group score for the first candidate group, a second candidate group score for the second candidate group and a last candidate group score for the last candidate group; and

for the first candidate group score, the second candidate group score and the last candidate group score to be approximately the same;

transmit a job request to at least a subset of driver devices of driver candidates in the first candidate group

responsive to a determination that the job request has been accepted by at least one driver candidate in the first candidate group, assign the service request to one of the driver candidates in the first candidate group that accepted the job request; responsive to a determination that the job request has not been accepted by any driver candidates in the first candidate group, transmit a job request to at least a subset of driver devices of the driver candidates in the second candidate group and, if the job request is accepted by at least one driver candidate in the second candidate group, assign the service request to one of the driver candidates in the second candidate group that accepted the job request, and if the job request is not accepted by any driver candidates in the second candidate group, transmit the job request to at least a subset of driver devices of the driver candidates in the last candidate group.

13. The computing system of claim 12, wherein the instructions cause the computing system to identify the plurality of driver candidates by receiving driver activity data in real time for each of a plurality of drivers; monitor the driver activity data for each of the plurality of drivers; and determine which of the plurality of drivers are available to accept the job request, wherein the plurality of driver candidates is a subset of the plurality of drivers.

14. The computing system of claim 12 or 13, wherein the instructions cause the computing system to group the plurality of driver candidates into a plurality of candidate groups by determining a ranking of the plurality of driver candidates based in part on the score of each of the plurality of driver candidates; determining a number of candidate groups;

and assigning each of the plurality of driver candidates to one of the plurality of groups based on the ranking.

15. The computing system of any one of claims 12 to 14, wherein the service request includes user location data identifying a geographic position of the user device, and the driver data includes driver location data identifying a geographic position of the driver, and wherein the instructions cause the computing system to generate a proximity score based on the user location data and the driver location data, wherein the score is generated based in part on the proximity score.

16. The computing system of any one of claims 12 to 15, wherein the instructions cause the computing system to generate a starvation score based on the driver data, the starvation score based in part on a number of unsuccessful acceptances by a driver over a predetermined period of time, wherein the score is generated based in part on the starvation score.

17. The computing system of claim 16, wherein the instructions cause the computing system to determine a ranking of the plurality of driver candidates by adding a starvation weight to one or more of the plurality of driver candidate, wherein the starvation weight is based in part of the starvation score, and the starvation weight increases the ranking of the one or more plurality of driver candidates.

18. The computing system of any one of claims 12 to 17, wherein the instructions cause the computing system to transmit the job request to driver devices of the second candidate group or the last candidate group of the plurality of candidate groups after waiting a predetermined amount of time from transmitting the job request to driver devices of the first candidate group or the second candidate group respectively.

19. The computing system of any one of claims 12 to 18, wherein the instructions cause the computing system to transmit the job request by transmitting the job request to driver devices of the first candidate group with the highest ranked plurality of driver candidates, wherein the sum of the scores of the highest ranked plurality of driver candidates is larger than or equal to the first candidate group score.

20. The computing system of any one of claims 12 to 19, wherein the instructions cause the computing system to determine the first candidate group score, the second candidate group score and the last candidate group score, wherein the respective group scores comprise a corresponding sum of the scores of a plurality of driver candidates within the respective candidate groups.

21. The computing system of any one of claims 12 to 19, wherein the instructions cause the computing system to determine the first candidate group score, the second candidate group score and the last candidate group score by summing the scores of the plurality of driver candidates to obtain a total score, determining a number of candidate groups to be formed, and dividing the total score by the number of candidate groups to obtain the first candidate group score, the second candidate group score and the last candidate group score.

22. The computing system of any one of claims 16 to 21, wherein the instructions cause the computing system to assign the service request by assigning the service request to the driver candidate having the highest starvation score.