Claims

1. A method of managing transport service providers, the method comprising:-

a provider data receiving step of receiving, in real time, a first data flow, the first data flow comprising data indicative of each of plural service providers, the data comprising an indication of the identity of each service provider, availability data of the respective service provider and an indication of the real time location of each the respective service provider;

a forecasting step of processing the first data flow and stored historical supply/demand data to provide a forecast of the number of service providers and number of services requests over an area comprising plural geographical zones, wherein the forecast is by zone;

a filter step of using availability criteria to filter out service providers from the first data flow to output data indicative of a set of candidate service providers who are eligible on the basis of the availability criteria for receiving notifications to move around, wherein the data indicative of each eligible candidate service provider includes an indication of the identity of each eligible candidate service provider associated with a location of the respective candidate service provider;

an optimization step of combining the data indicative of the set of candidate service providers eligible on the basis of the availability criteria, the data including an indication of the identity of each eligible candidate service provider associated with a location of the respective candidate service provider, with the forecast number of service providers and number of service requests and calculating therewith a matrix comprising data values indicating whether each service provider candidate is to be notified to relocate from their current zone, thereby to establish a subset of candidate service providers eligible to be moved from their current zone to a respective new zone; and of outputting a further data flow containing data indicative of the identity of each candidate of the subset and the respective new zone of the respective candidate and

a notification step of using the further data flow to output a respective notification to only each candidate service provider of the subset, the notification comprising a message customised to the respective service provider and indicating a new location in a new zone, whereby the number of service providers in at least some zones converges on the number of service requests.

2. The method of claim 1, further comprising receiving in real-time a request data flow comprising at least some of data indicative of a requester, time of request, pickup location and drop off location.

3. The method of claim 1 further comprising:-

receiving in real time a request data flow having at least some of data indicative of requester, time of request, pickup location and drop off location and;

storing data from said request data flow and the first data flow.

4. The method of claim 1, further comprising processing received service request data, the service provider status and location information and storing the result as historical demand and supply data.

5. The method of claim 1, wherein the forecasting step comprises applying a forecasting process to historical supply and demand imbalance data to predict what the imbalance would look like in one or more forthcoming time intervals for each zone covered by the system.

6. The method of claim 5, wherein the forecasting process employs one of Time Series forecasting techniques, such as Double Seasonal Holt-Winters (DSHW), AutoRegressive Integrated Moving Average (ARIMA) for demand and supply forecasting.

7. The method of claim 5, wherein the forecasting step comprises using machine learning techniques, such as Recurrent Neural Networks (RNN), Long Short Term Memory (LSTM) etc for demand and supply forecasting.

8. The method of claim 7 wherein the forecasting step additionally comprises using data from a third party data store storing externally supplied data.

9. The method of claim 1, wherein the optimization step comprises receiving forecasted demand and supply data, data indicative of the identity of candidate service providers and: historical aggregated temporal-spatial data.

10. The method of claim 9, wherein the historical aggregated temporal spatial data comprises at least one of average time or probability to find next job, average price multiplier (surge), average fare or average revenue for each geographical area in a given time period.

11. The method of claim 1, wherein the optimization step calculates one or more of :

i) the expected notification compliance probability matrix of candidate service providers moving to each geographical area;

ii) an "average probability to find next job" matrix of service provider candidates moving to each different geographical area; and

iii) an "expected revenue" matrix of service provider candidates moving to each different geographical area.

12. The method of claim 1 wherein the optimization step is controllable to achieve one or more objectives selected from

i) minimize the total supply-demand imbalance for the whole area (country, city etc.);

ii) minimize the total driving distance for all service provider candidates;

iii) minimize the average time to find next job for all service provider candidates; and

(iv) maximize the average probability to find next job for all service provider candidates.

13. Apparatus for managing transport service providers, comprising data storage and a processor operating under control of stored instructions to:-

receive, in real time, a first data flow, the first data flow comprising data indicative of each of plural service providers, the data comprising an indication of the identity of each service provider, availability data of the respective service provider and an indication of the real-time location of each the respective service provider;

read, from the storage, historical supply/demand data process the first data flow together with the historical supply/demand data to provide a forecast of the number of service providers and number of services requests over an area comprising plural geographical zones, wherein the forecast is by zone;

filter the first data flow using availability criteria to filter out service providers from the first data flow to output data indicative of a set of candidate service providers who are eligible on the basis of the availability criteria for receiving notification to move around, wherein the data indicative of each eligible candidate service provider includes an indication

of the identity of each eligible candidate service provider associated with a location of the respective candidate service provider;

combine the data indicative of the set of candidate service providers eligible on the basis of the availability criteria the data including an indication of the identity of each eligible candidate service provider associated with a location of the respective candidate service provider with the forecast number of service providers and number of service requests and calculate therewith a matrix comprising data values indicating whether each service provider candidate is to be notified to relocate from their current zone, thereby to establish a subset of candidate service providers eligible on the basis of the availability criteria and on the basis of one or more of distance and time to be moved from their current zone to respective new zone; and outputting a further data flow containing data indicative of the identity of each candidate of the subset and the respective new zone of the respective candidate and

use the further data flow to output a respective notification to only each candidate service provider of the subset, the notification comprising a message customized to the respective service provider and indicating a new location in a new zone, whereby the number of service providers in at least some zones converges on the number of service requests.

14. A computer program or computer program product comprising instructions for implementing the method of any one of claims 1 to 12.

15. A non-transitory storage medium storing instructions, which when executed by a processor cause the processor to perform the method of one of claims 1 to 12.