

Claims

1. A communications server apparatus for simulating supply and demand conditions related to a service or asset provision and deriving associated spatio-temporal prediction data, the communications server apparatus comprising a processor and a memory, and being
5 configured, under the control of the processor, to execute instructions stored in the memory to:
 obtain supply and demand data, said supply data comprising service or asset provider location and availability data and said demand data comprising user request data;
 generate, using said supply and demand data, aggregated supply and demand data comprising a plurality of data records associated with a plurality of respective predetermined
10 time periods, each record being representative of an available supply pool of one or more service provider/asset types in one of a plurality of regions, and demand therefor, during the respective predetermined time period;
 generate, using said supply and demand data, probability data for each of said plurality of regions and supply pools in relation to respective predetermined time slots, said probability
15 data comprising probability values representative of a likelihood of demand associated with each respective time slot in each region for each supply pool;
 perform a simulation of supply and demand conditions in said plurality of regions by mapping said aggregated supply and demand data to said probability data in a trained forecasting model and generating prediction data for each of said plurality of regions and supply
20 pools, said prediction data being representative of a probability that a service or asset provider will receive a user request in a specified region within a predetermined period of time; and
 output said prediction data for display on a service or asset provider communications device.
- 25 2. A communications server apparatus according to claim 1, further configured to only output prediction data for each supply pool for display on communications devices of service or asset providers recorded as belonging to a service provider/asset type of the respective supply pool.
- 30 3. A communications server apparatus according to claim 1 or claim 2, for simulating supply and demand conditions related to a transport service, wherein said demand data comprises user bookings data.

4. The communications server device of claim 1, 2 or 3, further comprising a database configured to store live supply and demand data as historical supply and demand data.

5. The communications server apparatus of claim 4, further configured to generate supply pooling logic for mapping a service or asset provider type to a supply pool by deriving one or more supply pools based on historical supply and demand data obtained from said database, and grouping sets of one or more service or asset provider types into supply pools representing greatest demand in a region during each of a plurality of predetermined time periods.

6. The communications server apparatus of any of claims 1 to 5, further configured to generate said aggregated supply and demand data by generating sequential data records, each representative of a predetermined time period and comprising data representative of demand during each of a plurality of time slot in relation to specified supply pools.

7. The communications server apparatus of any of claims 1 to 6, further configured to generate said probability data for each time slot in each region for each supply pool by calculating a probability value based on supply and demand in the respective region during the respective predetermined time period, adjusted to take account of low supply and/or demand conditions.

8. The communications server apparatus of claim 7, further configured to calculate a probability value for each time slot in each region for each supply pool using an adjusted empirical probability calculation for that time slot, region and supply pool wherein a demand count from another time period for the same region and supply pool is added to the numerator and denominator thereof.

9. The communications server apparatus of claim 7 or claim 8, further configured to calculate a probability value for each time slot in each region for each supply pool using an adjusted empirical probability calculation wherein 1 is added to the denominator thereof.

10. The communications server apparatus of claim 4, further configured to generate a training data set for use in generating said trained forecasting model, said training data set

comprising aggregated supply and demand data and probability data derived from historical supply and demand data, stored in said database, for said plurality of regions.

11. The communications server apparatus of claim 10, further configured to periodically
5 update said trained forecasting model with new aggregated supply and demand data and probability data derived from recent historical supply and demand data, stored in said database, for said plurality of regions.

12. The communications server apparatus of any of the preceding claims, further comprising
10 an API service, and configured to output said prediction data for a specified supply pool, via said API service, to a communications device of a service or asset provider belonging to a service provider/asset type of that supply pool.

13. The communications server apparatus of claim 12, wherein said API service is a heatmap
15 service configured to output said prediction data for said specified supply pool to said communications device of a service or asset provider for display thereon as a heatmap representative of the probability of a service provider receiving a booking in one or more of the plurality of regions within a said predetermined time period.

14. A communications server apparatus according to claim 10 or claim 11, further
20 configured to monitor the performance of said forecasting model and to perform a retraining process in respect thereof in the event that said performance drops below a predetermined threshold.

15. A communications server apparatus according to claim 14, wherein said retraining
25 process comprises determining the aggregated supply and demand data that caused a drop in said performance of the forecasting model, and re-sampling aggregated supply and demand data and probability data including the aggregated supply and demand data that caused a drop in said performance, to generate a new training data set for use in retaining said forecasting model.

16. A method, performed in a service provider apparatus, for simulating supply and demand
30 conditions related to a service or asset provision and deriving associated spatio-temporal

prediction data, the method comprising, under control of a processor of the communications server apparatus:

obtaining supply and demand data, said supply data comprising service or asset provider location and availability data and said demand data comprising user request data;

5 generating, using said supply and demand data, aggregated supply and demand data comprising a plurality of data records associated with a plurality of respective predetermined time periods, each record being representative of an available supply pool of one or more service or asset provider types in one of a plurality of regions, and demand therefor, during the respective predetermined time period;

10 generating, using said supply and demand data, probability data for each of said plurality of regions and supply pools in relation to respective predetermined time slots, said probability data comprising probability values representative of a likelihood of demand associated with each respective time slot in each region for each supply pool;

performing a simulation of supply and demand conditions in said plurality of regions by
15 mapping said aggregated supply and demand data to said probability data in a trained forecasting model and generating prediction data for each of said plurality of regions and supply pools, said prediction data being representative of a probability that a service or asset provider belonging to a service provider/asset type of a specified supply pool will receive a user request in a specified region within a predetermined period of time; and

20 outputting said prediction data for each supply pool for display on a communications device of a service or asset provider belonging to a respective service provider/asset type.

17. A method according to claim 16, wherein outputting said prediction data comprises only
25 outputting prediction data for each supply pool for display on communications devices of service or asset providers recorded as belonging to a service provider/asset type of the respective supply pool.

18. A computer program or computer program product comprising instructions for
30 implementing the method of claim 16.

19. A non-transitory storage medium storing instructions which, when executed by a processor, cause the processor to perform the method of claim 16.

20. A communications system for simulating supply and demand conditions related to a service or asset provision and deriving associated spatio-temporal prediction data, at least one user communications device and communications network equipment operable for the communications server apparatus and the at least one user communications device to establish communication with each other therethrough, and at least one service or asset provider communications device and communications network equipment operable for the communications server apparatus and the at least one service provider communications device to establish communication with each other therethrough, the service provider communications device comprising a display for displaying data representative of a plurality of geographical regions, the communications server apparatus comprising a processor and a memory, and being configured, under the control of the processor, to execute instructions stored in the memory to:

obtain supply and demand data, said supply data comprising service or asset provider location and availability data received from said at least one service or asset provider communications device, and said demand data comprising user request data received from said at least one user communications device;

generate, using said supply and demand data, aggregated supply and demand data comprising a plurality of data records associated with a plurality of respective predetermined time periods, each record being representative of an available supply pool of one or more service or asset provider types in one of a plurality of regions, and demand therefor, during the respective predetermined time period;

generate, using said supply and demand data, a probability data for each of said plurality of regions and supply pools in relation to respective predetermined time periods;

perform a simulation of supply and demand conditions in said plurality of regions by mapping said aggregated supply and demand data to said probability data in a trained forecasting model and generating prediction data for each of said plurality of regions and supply pools, said prediction data being representative of a probability that a service or asset provider will receive a user request in a specified region within a predetermined period of time; and

output prediction data relating to said plurality of regions for display on a service or asset provider communications device.