

WHAT IS CLAIMED IS:

1. A method for robot elevator-taking path planning, comprising:

step S1, obtaining the starting floor and the ending floor of the robot;

5 step S2, determining all elevator groups that can reach the starting floor to form a cache path sequence; wherein, each cache path in the cache path sequence includes an elevator group sequence, an elevator sequence, a floor sequence and an expected time point sequence;

 step S3, traversing all the cache paths, if the elevator group
10 corresponding to the traversed cache path can reach the ending floor directly, adding the cache path to the available path sequence; otherwise, taking the last floor in the floor sequence of the elevator group corresponding to the current cache path as the current floor;

 traversing all transfer elevator groups reachable from the current floor,
15 and excluding the duplicate elevator groups in all transfer elevator groups and the current cache path; if the traversed transfer elevator group can reach the ending floor, adding the transfer elevator group and the ending floor to the current cache path, and adding the current cache path to the available path sequence as an elevator-taking path; and

20 step S4, repeating the step S3 until all cache paths are traversed;

 the method involves a server and a client, the client includes a robot; and the method comprises:

 obtaining the historical data of the elevator group in each preset time period;

25 calculating the expected data of each floor of the individual elevators in the elevator group according to the historical data; and

 receiving the elevator-taking request sent by the robot, according to the elevator-taking request building information and the expected data back to the robot; the robot configured for calculating the final expected periods

according to the building information and the expected data;

the elevator-taking request includes a user identification code, user authentication information, and elevator-taking information, and the elevator-taking information includes a start time, starting floor and target
5 floor;

a method for floor crowd size prediction based on elevator operation data, wherein the historical data in the method includes event messages, location information and elevator running state; comprising:

obtaining event messages, position information and elevator running
10 state during the running process of the elevator, wherein the running state of the elevator includes up and down, the position information includes the current position and the passing floors during the running process;

determining an elevator passenger carrying state based on the event message, wherein the elevator carrying state includes carrying passengers
15 and not carrying passengers;

if the current position is a stopping floor, updating the crowd index of each floor based on the elevator passenger carrying state and the elevator running state to obtain the updated crowd index of each floor; and

determining the crowd size of each floor based on the preset judgment
20 condition and the target index; wherein the target index is the updated crowd index obtained after the elevator runs for a preset cycle.

2. The method according to claim 1, wherein determining an elevator passenger carrying state based on the event message comprises:

if the event message includes a door opening event, recording the time
25 corresponding to the door opening event as the first-time node, and continue to monitor the event message of the elevator running process;

recording a time node corresponding to the elevator startup event as a second time node when receiving an event message including an elevator startup event;

30 calculating the difference between the first-time node and the second

time node as the startup operation interval; and

comparing the startup operation interval with the preset startup threshold, if the startup operation interval exceeds the preset startup threshold, confirming that the elevator passenger carrying state is not
5 carrying passengers, otherwise, confirming that the elevator passenger carrying state is carrying passengers.

3. The method according to claim 1, wherein the elevator passenger carrying state is carrying passengers, and if the current position is a stopping floor, updating the crowd index of each floor based on the elevator passenger
10 carrying state and the elevator running state to obtain the updated crowd index of each floor comprises:

adding 1 to the crowd index of the floor corresponding to the current position when the elevator running state is up, and determining whether the floor corresponding to the current position is an access floor;

15 if the floor corresponding to the current position is the access floor, subtracting 1 from the crowd index of the access floor to obtain the updated crowd index of each floor; and

if the floor corresponding to the current position is a non-access floor and the floor corresponding to the current position is the floor that stops for
20 the first time in this up, subtracting 1 from the crowd index of the last passing floor of the floor corresponding to the current position to obtain the updated crowd on each floor index.

4. The method according to claim 1, wherein the elevator passenger carrying state is carrying passengers, and if the current position is a stopping
25 floor, updating the crowd index of each floor based on the elevator passenger carrying state and the elevator running state to obtain the updated crowd index of each floor further comprises:

determine whether the current position is an access floor when the elevator running state is down;

30 if the current location is the access floor; subtracting 1 from the crowd

index of the floor passing by the elevator during this running process and clear the record of the floor passing by; and

if the current location is the non-access floor; subtracting 1 from the crowd index of the floor passing by the elevator during this running process, adding 1 to the crowd index of the floor corresponding to the current position of the elevator and clear the passing floor record.

5. The method according to claim 1, wherein the elevator passenger carrying state is no passenger, and if the current position is a stopping floor, updating the crowd index of each floor based on the elevator passenger carrying state and the elevator running state to obtain the updated crowd index of each floor further comprises:

determining whether the current location is an access floor based on the location information;

if the current location is the access floor; subtracting 1 from the crowd index of the floor passing by the elevator during this running process and clear the record of the floor passing by; and

if the current location is the non-access floor; subtracting 1 from the crowd index of the floor passing by the elevator during this running process, adding 1 to the crowd index of the floor corresponding to the current position of the elevator and clear the passing floor record.

6. An apparatus for robot elevator-taking path planning, comprising:

an initialize module configured for obtaining the starting floor and the ending floor of the robot;

a cache path module configured for determining all elevator groups that can reach the starting floor to form a cache path sequence; wherein, each cache path in the cache path sequence includes an elevator group sequence, an elevator sequence, a floor sequence and an expected time point sequence;

an available path determination module configured for traversing all the cache paths, if the elevator group corresponding to the traversed cache path can reach the ending floor directly, adding the cache path to the available

path sequence; otherwise, taking the last floor in the floor sequence of the elevator group corresponding to the current cache path as the current floor;

traversing all transfer elevator groups reachable from the current floor, and excluding the duplicate elevator groups in all transfer elevator groups and the current cache path; if the traversed transfer elevator group can reach the ending floor, adding the transfer elevator group and the ending floor to the current cache path, and adding the current cache path to the available path sequence as an elevator-taking path; and

repeating the above steps until all cache paths are traversed.

10 7. A prediction apparatus of floor crowd size based on elevator operation data, wherein the historical data in the method of any one of claims 1 to 5 includes event messages, location information and elevator running state; comprising:

an information acquisition module configured for obtaining event
15 messages, position information and elevator running state during the running process of the elevator, wherein the running status of the elevator includes up and down, and the position information includes the current position and the passing floors during the running process;

a state determination module configured for determining an elevator
20 passenger carrying state based on the event message, wherein the elevator carrying state includes carrying passengers and not carrying passengers;

an index update module configured for, if the current position is a
stopping floor, updating the crowd index of each floor based on the elevator
passenger carrying state and the elevator running state to obtain the updated
25 crowd index of each floor; and

a size determination module configured for determine the crowd size of
each floor based on the preset judgment condition and the target index;
wherein the target index is the updated crowd index obtained after the
elevator runs for a preset period.

30 8. A computer device, comprising a memory and one or more processors,

computer-readable instructions are stored in the memory, and the computer-readable instructions, when being executed by the one or more processors, enables the one or more processors to execute the steps of the method according to any of claim 1 to 5.

- 5 9. A computer-readable storage medium storing a computer program, wherein the computer program, when executed by a processor, implements the steps of the method according to any one of claim 1 to 5.