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Method For Cell Selection And System Determination During Network Connection

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METHOD FOR CELL SELECTION AND SYSTEM DETERMINATION DURING NETWORK CONNECTION

ABSTRACT

A system and method are disclosed that incorporate a machine learning algorithm for optimizing mobile system and cell selection. The system collects data from a large number of devices or from network operators spread over a geographic region to update the machine learning algorithm. The data collected by the algorithm includes location of the device, location of the cell, RAT (radio access technology) or band acquired by the device. The algorithm recommends the mobile system to connect to the best possible network from among alternatives. The device logs particulars of the connected network if connection is successful, or failure to connect, which is used to update and improve the algorithm. This method of cell selection is much faster and more efficient than the complex algorithms currently used by networks. The method eliminates the problems such as slow connectivity and getting stuck in a lower speed network encountered by devices.

BACKGROUND

In modern cellular communication systems, the modems typically use a deterministic state machine approach to scan through bands of different RATS (radio access technologies) to select a cell. The following examples illustrate the problem: 2 users U1 and U2 are in a restaurant, each with the same SIM card and service plan from the same provider. Only 2G signal is available in the restaurant. When both come out of the restaurant, U1's phone gets attached to 4G but U2's phone is stuck in the 2G network. In another example, a user sometimes does not have any service at home even though it works well most of the time. The complexity of mobile communication system determination algorithms is probably the cause of a device not

acquiring a cell even though the cell may exist and work well. Thus, connection to a service consumes more time and the device is not always connected to the best RAT available.

DESCRIPTION

A system and method are disclosed that enables mobile communication system determination and cell selection from multiple devices in various locations. The system may include a system application running on the device, communicating with a machine learning algorithm (MLA) on device. The method includes running the MLA for mobile system determination and cell selection as depicted in FIG. 1. The MLA may communicate with a high level db on the cloud when connected, to periodically download an updated model and to upload new data. The first part of the algorithm includes collecting the data. Data is collected by enabling the device application to collect cell selection information and upload it to the central server where the machine learning model is generated. Additionally, the system may get cell information from the network providers. The second part of the algorithm involves analysis of the collected data and updating the machine learning algorithm.

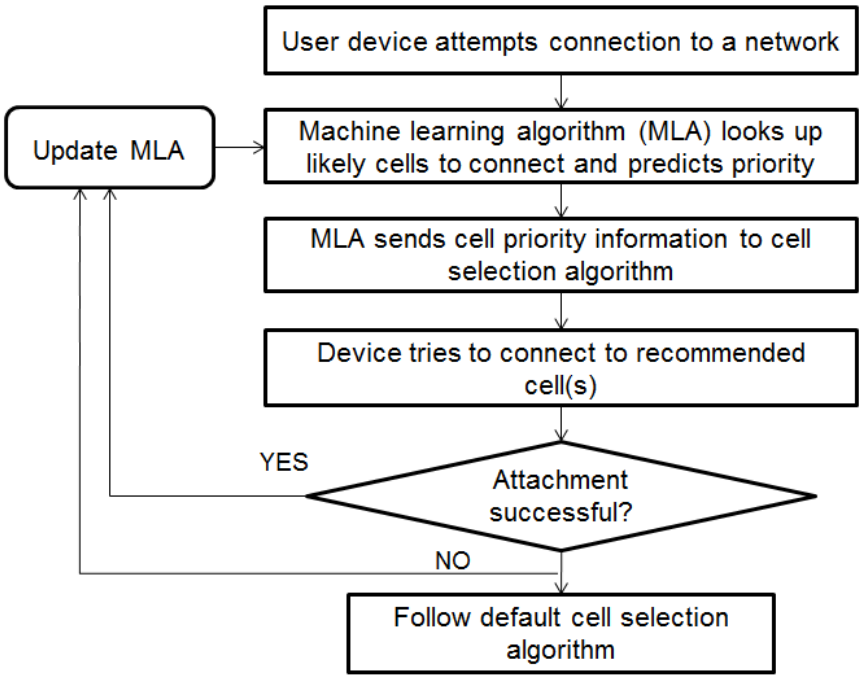

FIG. 1: Method to enable cell selection during user's attempt to connect to a network

As shown in FIG. 1, if it is possible to predict cell priority with reasonable certainty from the data collected, the recommendation is used to attach the device to the appropriate cell. The device tries to connect to the cells recommended by the MLA in order of priority. If it is able to successfully attach to a recommended cell then it may update the local cache so that MLA can improve its prediction.

If the cell selection algorithm is not able to attach to the suggested cells then the method falls back to the default algorithm on the device to find a cell. The inability to attach using the cell recommendations is updated to the MLA.

Data collected for the MLA may include details of the service provider (network operator), location of the device, location of the cell, RAT or band acquired by the device. The MLA may use logistic regression or any other known machine learning technique for prediction.

The disclosed method of cell selection could work much faster than the conventional method. It helps the user by avoiding getting stuck in a lower speed network. Historical data can be used to improve the learning algorithm that can enable progressively faster cell selection. The method finds application in mobile communication systems.