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(54) Title: METHOD AND SERVER FOR SEARCHING FOR NEARBY USER IN SOCIAL NETWORK

(54) 发明名称: 在社交网络中查找附近用户的方法和服务器

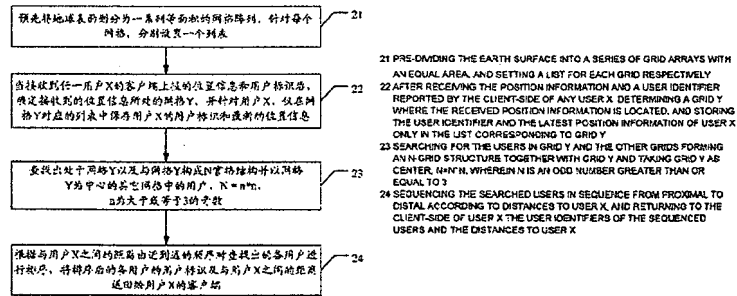


图 2 / Fig. 2

(57) Abstract: Disclosed are a method and server for searching for nearby users in a social network, the method comprising: after receiving the position information and a user identifier reported by the client-side of any user X, determining a grid Y where the received position information is located, and storing the user identifier and the latest position information of user X only in the list corresponding to grid Y, grid Y being any one grid in a series of grid arrays with an equal area pre-plotted on the earth surface; searching for the users in grid Y and the other grids forming an N-grid structure together with grid Y and taking grid Y as center; sequencing the searched users in the sequence from proximal to distal according to distances to user X, and returning to the client-side of user X the user identifiers of the sequenced users and the distances to user X; the reporting time can be further considered as another factor in the sequencing process. The method and device of the present invention improve the accuracy of search result.

(57) 摘要: 本发明公开了在社交网络中查找附近用户的方法和服务器: 当接收到任一用户 X 的客户端上报的位置信息和用户标识后, 确定接收到的位置信息所处的网格 Y, 并针对用户 X, 仅在网格 Y 对应的列表中保存用户 X 的用户标识和最新的位置信息; 其中, 网格 Y 为预先将地球表面划分为的一系列等面积的网络阵列中的任一个网格; 查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户; 根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排序, 将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端; 在进行排序时, 还可进一步考虑上报时间这一因素。应用本发明所述的方法和装置, 能够提高查找结果的准确性。

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本国际公布:

— 包括国际检索报告(条约第21条(3))。

在社交网络中查找附近用户的方法和服务器

本申请要求于 2011 年 11 月 16 日提交中国专利局、申请号为 201110363120.4、发明名称为“在社交网络中查找附近用户的方法和服务器”的中国专利申请的优先权，其全部内容通过引用结合在本申请中。

5 技术领域

本发明涉及互联网技术，特别涉及在社交网络中查找附近用户的方法和服务器。

发明背景

在社交网络中，某些情况下，用户可能会需要查找出自己附近的用户，进而与其进行联系，以便来交友或寻求帮助等。

现有技术中，可采用以下查找方式：服务器按照经纬度信息预先将地球表面划分为一系列等面积的网格阵列；对于任一用户，假设为用户 X，当其需要查找附近用户时，会通过自身所使用的客户端向服务器上
15 报自己的位置信息和用户标识，所述客户端可为移动终端等，位置信息可为经纬度信息等；服务器接收到用户 X 上报的位置信息后，首先确定该位置信息所处的网格，之后，查找出同处于该网格的其它用户，并将查找出的其它用户的用户标识以及与用户 X 之间的距离等返回给用户 X 的客户端。

但是，上述方式在实际应用中会存在一定的问题，即：用户 X 有可能处于两个相邻网格的边界附近，图 1 为用户 X 所处位置的示意图，如图 1 所示，两个相邻网格分别为网格 A 和网格 B，用户 X 和用户 Z 均处于网格 A 中，用户 Y 处于网格 B 中，对于用户 X 来说，其与用户 Y

之间的距离会比与用户 Z 之间的距离更近, 如果要寻求帮助等, 用户 Y 显然比用户 Z 更合适, 但按照现有方式, 用户 X 将只能查找到用户 Z, 而不能查找到用户 Y, 即查找结果不够准确。

发明内容

5 有鉴于此, 本发明提供了在社交网络中查找附近用户的方法和服务器, 能够提高查找结果的准确性。

为达到上述目的, 本发明的技术方案是这样实现的:

一种在社交网络中查找附近用户的方法, 包括:

10 当接收到任一用户 X 的客户端上报的位置信息和用户标识后, 确定接收到的位置信息所处的网格 Y, 并针对用户 X, 仅在网格 Y 对应的列表中保存用户 X 的用户标识和最新的位置信息; 其中, 网格 Y 为预先将地球表面划分为的一系列等面积的网格阵列中的任一个网格;

查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户, $N = n * n$, n 为大于或等于 3 的奇数;

15 根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排序, 将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

一种在社交网络中查找附近用户的方法, 包括:

20 当接收到任一用户 X 的客户端上报的位置信息和用户标识后, 确定接收到的位置信息所处的网格 Y, 并针对用户 X, 仅在网格 Y 对应的列表中保存用户 X 的用户标识、最新的位置信息和最新的上报时间; 其中, 网格 Y 为预先将地球表面划分为的一系列等面积的网格阵列中的任一个网格;

查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中

心的其它网格中的用户， $N = n * n$ ， n 为大于或等于3的奇数；

综合与用户 X 之间的距离以及上报时间对查找出的各用户进行排序，将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端；其中，与用户 X 之间的距离越近，排序越靠前，上报时间距
5 离当前时间越近，排序越靠前。

一种服务器，包括：

第一处理模块，用于预先将地球表面划分为一系列等面积的网格阵列，针对每个网格，分别设置一个列表；

第二处理模块，用于当接收到任一用户 X 的客户端上报的位置信息
10 和用户标识后，确定接收到的位置信息所处的网格 Y，并针对用户 X，仅在网格 Y 对应的列表中保存用户 X 的用户标识和最新的位置信息；查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户， $N = n * n$ ， n 为大于或等于3的奇数；根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排序，将排序后的各用
15 户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

一种服务器，包括：

第一处理模块，用于预先将地球表面划分为一系列等面积的网格阵列，针对每个网格，分别设置一个列表；

第二处理模块，用于当接收到任一用户 X 的客户端上报的位置信息
20 和用户标识后，确定接收到的位置信息所处的网格 Y，并针对用户 X，仅在网格 Y 对应的列表中保存用户 X 的用户标识、最新的位置信息和最新的上报时间；查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户， $N = n * n$ ， n 为大于或等于3的奇数；综合与用户 X 之间的距离以及上报时间对查找出的各用户进行排序，将
25 排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

端；其中，与用户 X 之间的距离越近，排序越靠前，上报时间距离当前时间越近，排序越靠前。

可见，采用本发明所述方案，不但在用户 X 所处的网格内进行查找，而且对其所处网格的周边网格也进行查找，并将查找出的用户按照与用户 X 的距离由近到远的顺序进行排序，这样一来，即使某一用户与用户 X 不处于同一网格，但如果其距离用户 X 比较近的话，也会被查找到并优先展示给用户 X，从而提高了查找结果的准确性；而且，本发明所述方案在排序时还可进一步考虑上报时间这一因素，上报时间距离当前时间越近，用户 X 联系到该用户的可能性就越大，因此排序会越靠前，从而进一步提高了查找结果的准确性。

附图简要说明

下面将通过参照附图详细描述本发明的示例性实施例，使本领域的普通技术人员更清楚本发明的上述及其它特征和优点，附图中：

图 1 为用户 X 所处位置的示意图；

图 2 为本发明在社交网络中查找附近用户的方法第一实施例的流程图；

图 3 为网格 Y 与其周边网格所构成的 9 宫格结构的示意图；

图 4 为本发明在社交网络中查找附近用户的方法第二实施例的流程图；

图 5 为本发明服务器实施例的组成结构示意图。

实施本发明的方式

针对现有技术中存在的问题，本发明中提出一种改进后的查找附近用户的方案，能够提高查找结果的准确性。

为使本发明的技术方案更加清楚、明白，以下参照附图并举实施例，对本发明所述方案作进一步地详细说明。

图2为本发明在社交网络中查找附近用户的方法第一实施例的流程图。如图2所示，包括以下步骤：

5 步骤21：预先将地球表面划分为一系列等面积的网格阵列，针对每个网格，分别设置一个列表。

可根据经纬度信息将地球表面划分为一系列等面积的网格阵列，每个网格的大小可根据实际需要而定，比如为1平方公里。

初始阶段，每个列表中的内容均为空。

10 步骤22：当接收到任一用户X的客户端上报的位置信息和用户标识后，确定接收到的位置信息所处的网格Y，并针对用户X，仅在网格Y对应的列表中保存用户X的用户标识和最新的位置信息。

所述位置信息通常是指经纬度信息，由于各网格均是根据经纬度信息进行划分的，因此本步骤中，可以很容易地确定出接收到的位置信息
15 所处的网格。

为表述方便，本发明各实施例中，用用户X来代表任一用户，用网格Y来代表用户X所处的网格。

确定出网格Y之后，可将接收到的用户标识和位置信息保存到网格Y对应的列表中，这样，如果后续其它用户也要在网格Y内查找附近用
20 户，那么用户X即会被查找到。

需要说明的是，在实际应用中，用户X可能不止一次具有查找附近用户的需求，相应地，上报用户标识和位置信息的次数也就可能不止一次，本实施例中，仅在网格Y对应的列表中保存用户X的用户标识和最
新的位置信息，以保证用户信息的唯一性。

25 举例说明：

假设用户 X 之前处于网格 A 中, 并上报过自己的用户标识和位置信息, 那么, 在网格 A 对应的列表中就会保存有用户 X 的用户标识和位置信息, 之后, 用户 X 所处的网格变为了网格 B, 并再次上报了自己的用户标识和位置信息, 那么, 则删除网格 A 对应的列表中所保存的用户 X 的用户标识和位置信息, 并将用户 X 的用户标识和位置信息保存到网格 B 对应的列表中。

步骤 23: 查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户, $N = n * n$, n 为大于或等于 3 的奇数。

N 宫格这种结构可以保证用户 X 周边各个方向上的其它用户均可被查找找到。

n 的具体取值可根据实际需要而定, 比如对于人口比较密集的广州、北京、上海等地区, N 的取值可为 3, 而对于人口比较稀疏的青海、内蒙等地区, N 的取值可为 5 或 7 等。

图 3 为网格 Y 与其周边网格所构成的 9 宫格结构的示意图。

如果本步骤中所述的 N 宫格即为图 3 所示的 9 宫格, 那么这 9 个网格对应的列表中的用户即为查找出的用户, 当然, 除用户 X 自身以外。

步骤 24: 根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排序, 将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

由于查找出的各用户的位置信息是已知的, 用户 X 的位置信息也是已知的, 因此可以计算出查找出的各用户与用户 X 之间的距离, 并完成排序。

相比于现有方式, 本实施例所述方式的查找范围明显增大, 那么查找出的用户数也会明显增多, 而对于用户 X 来说, 排序比较靠后的那些用户基本上不会关注, 因此, 也无需将这些用户返回给用户 X, 同时可

减少数据传输量，节省带宽资源等。

为此，在完成排序之后，可首先确定查找出的用户数是否小于或等于M，如果是，则将排序后的各用户的用户标识及与用户X之间的距离返回给用户X的客户端，否则，仅将排序后处于前M位的各用户的用户标识及与用户X之间的距离返回给用户X的客户端，M为大于1的正整数，具体取值可根据实际需要而定。

另外，在实际应用中，除返回查找出的各用户的用户标识及与用户X之间的距离外，还可返回一些其它信息，如用户的头像等。

后续，用户X如何与返回的用户进行联系为现有技术。

10 图4为本发明在社交网络中查找附近用户的方法第二实施例的流程图。如图4所示，包括以下步骤：

步骤41：预先将地球表面划分为一系列等面积的网格阵列，针对每个网格，分别设置一个列表。

15 步骤42：当接收到任一用户X的客户端上报的位置信息和用户标识后，确定接收到的位置信息所处的网格Y，并针对用户X，仅在网格Y对应的列表中保存用户X的用户标识、最新的位置信息和最新的上报时间。

步骤43：查找出处于网格Y以及与网格Y构成N宫格结构并以网格Y为中心的其它网格中的用户， $N=n*n$ ，n为大于或等于3的奇数。

20 步骤44：综合与用户X之间的距离以及上报时间对查找出的各用户进行排序，将排序后的各用户的用户标识及与用户X之间的距离返回给用户X的客户端；其中，与用户X之间的距离越近，排序越靠前，上报时间距离当前时间越近，排序越靠前。

25 与图2所示实施例相比，本实施例中在进行排序时，进一步考虑了上报时间这一因素，相应地，步骤42中，需要在网格Y对应的列表中

进一步保存用户 X 上报用户标识和位置信息的上报时间。

步骤 44 中，可针对查找出的每个用户 i ，分别计算其权值 $A_i = a * D_i + b * T_i$ ；其中， a 和 b 均为加权系数，具体取值均可根据实际需要而定， D_i 表示用户 i 与用户 X 之间的距离， T_i 表示当前时间与用户 i 的上报时间之间相距的时长；之后，按照权值由小到大的顺序对各用户进行排序。

在完成排序之后，可首先确定查找出的用户数是否小于或等于 M ，如果是，则将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，否则，仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端， M 为大于 1 的正整数。

图 4 所示实施例中与图 2 所示实施例中相同的部分不再赘述，请参照前述相应说明。

上述两个实施例中，用户 X 的客户端在获取自身的位置信息时，可采用以下方式，即依次按照方式 1 ~ 方式 L 获取自身的位置信息，一旦获取成功，则进行上报，否则，按照下一方式进行获取， L 为大于 1 的正整数；对于不同的方式来说，编号越小，获取到的位置信息的准确度越高。

L 的取值通常为 3，相应地，方式 1 可为通过全球定位系统（GPS, Global Positioning System）功能来获取位置信息，方式 2 可为通过所在基站的小区标识（Cell ID）来获取位置信息，方式 3 可为通过所连接的无线保真（WiFi, Wireless Fidelity）接入点的媒体接入控制（MAC, Media Access Control）地址来获取位置信息，具体实现均为现有技术。

至此，即完成了关于本发明方法实施例的介绍。

基于上述介绍，图 5 为本发明服务器实施例的组成结构示意图。如图 5 所示，包括：

第一处理模块, 用于预先将地球表面划分为一系列等面积的网格阵列, 针对每个网格, 分别设置一个列表;

第二处理模块, 用于当接收到任一用户 X 的客户端上报的位置信息和用户标识后, 确定接收到的位置信息所处的网格 Y, 并针对用户 X,

5 仅在网格 Y 对应的列表中保存用户 X 的用户标识和最新的位置信息; 查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户, $N = n * n$, n 为大于或等于 3 的奇数; 根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排序, 将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

10 其中, 第二处理模块可进一步用于, 进行排序之后, 确定查找出的用户数是否小于或等于 M, 如果是, 则将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端, 否则, 仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端, M 为大于 1 的正整数。

15 或者,

第一处理模块, 用于预先将地球表面划分为一系列等面积的网格阵列, 针对每个网格, 分别设置一个列表;

第二处理模块, 用于当接收到任一用户 X 的客户端上报的位置信息和用户标识后, 确定接收到的位置信息所处的网格 Y, 并针对用户 X,

20 仅在网格 Y 对应的列表中保存用户 X 的用户标识、最新的位置信息和最新的上报时间; 查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户, $N = n * n$, n 为大于或等于 3 的奇数; 综合与用户 X 之间的距离以及上报时间对查找出的各用户进行排序, 将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端; 其中, 与用户 X 之间的距离越近, 排序越靠前, 上报时间距离当前

25

时间越近，排序越靠前。

其中，第二处理模块可针对查找出的每个用户 i ，分别计算其权值 $A_i = a * D_i + b * T_i$ ，其中， a 和 b 均为加权系数， D_i 表示用户 i 与用户 X 之间的距离， T_i 表示当前时间与用户 i 的上报时间之间相距的时长；按照

5 权值由小到大的顺序对各用户进行排序。

第二处理模块还可进一步用于，进行排序之后，确定查找出的用户数是否小于或等于 M ，如果是，则将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，否则，仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，

10 M 为大于 1 的正整数。

图 5 所示装置实施例的具体工作流程请参照上述方法实施例中的相应说明，不再赘述。

总之，采用本发明所述方案，不但在用户 X 所处的网格内进行查找，而且对其所处网格的周边网格也进行查找，并将查找出的用户按照与用户 X 的距离由近到远的顺序进行排序，这样一来，即使某一用户与用户 X 不处于同一网格，但如果其距离用户 X 比较近的话，也会被查找到并优先展示给用户 X ，从而提高了查找结果的准确性；而且，本发明所述方案在排序时还可进一步考虑上报时间这一因素，上报时间距离当前时间越近，用户 X 联系到该用户的可能性就越大，因此排序会越靠前，从而

15 而进一步提高了查找结果的准确性。

20

以上所述仅为本发明的较佳实施例而已，并不用以限制本发明，凡在本发明的精神和原则之内，所做的任何修改、等同替换、改进等，均应包含在本发明的保护范围之内。

权利要求书

1、一种在社交网络中查找附近用户的方法，其特征在于，包括：

当接收到任一用户 X 的客户端上报的位置信息和用户标识后，确定接收到的位置信息所处的网格 Y，并针对用户 X，仅在网格 Y 对应的列表
5 表中保存用户 X 的用户标识和最新的位置信息；其中，网格 Y 为预先将地球表面划分为的一系列等面积的网格阵列中的任一个网格；

查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户， $N = n * n$ ，n 为大于或等于 3 的奇数；

根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排
10 序，将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

2、根据权利要求 1 所述的方法，其特征在于，所述进行排序之后，进一步包括：

确定查找出的用户数是否小于或等于 M，如果是，则将排序后的各
15 用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端；

否则，仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，M 为大于 1 的正整数。

3、根据权利要求 1 或 2 所述的方法，其特征在于，所述接收上报的位置信息之前，进一步包括：

20 用户 X 的客户端依次按照方式 1 ~ 方式 L 获取自身的位置信息，一旦获取成功，则进行上报，否则，按照下一方式进行获取，L 为大于 1 的正整数；

对于不同的方式来说，编号越小，获取到的位置信息的准确度越高。

4、一种在社交网络中查找附近用户的方法，其特征在于，包括：

当接收到任一用户 X 的客户端上报的位置信息和用户标识后，确定接收到的位置信息所处的网格 Y，并针对用户 X，仅在网格 Y 对应的列表中保存用户 X 的用户标识、最新的位置信息和最新的上报时间；其中，网格 Y 为预先将地球表面划分为的一系列等面积的网格阵列中的任一
5 个网格；

查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户， $N = n * n$ ，n 为大于或等于 3 的奇数；

综合与用户 X 之间的距离以及上报时间对查找出的各用户进行排序，将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X
10 的客户端；其中，与用户 X 之间的距离越近，排序越靠前，上报时间距离当前时间越近，排序越靠前。

5、根据权利要求 4 所述的方法，其特征在于，所述进行排序包括：

针对查找出的每个用户 i，分别计算其权值 $A_i = a * D_i + b * T_i$ ；其中，a 和 b 均为加权系数， D_i 表示用户 i 与用户 X 之间的距离， T_i 表示当前时间
15 间与用户 i 的上报时间之间相距的时长；

按照权值由小到大的顺序对各用户进行排序。

6、根据权利要求 4 所述的方法，其特征在于，所述进行排序之后，进一步包括：

确定查找出的用户数是否小于或等于 M，如果是，则将排序后的各
20 用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端；

否则，仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，M 为大于 1 的正整数。

7、根据权利要求 4、5 或 6 所述的方法，其特征在于，所述接收上报的位置信息之前，进一步包括：

25 用户 X 的客户端依次按照方式 1 ~ 方式 L 获取自身的位置信息，一

一旦获取成功，则进行上报，否则，按照下一方式进行获取，L 为大于 1 的正整数；

对于不同的方式来说，编号越小，获取到的位置信息的准确度越高。

8、一种服务器，其特征在于，包括：

5 第一处理模块，用于预先将地球表面划分为一系列等面积的网格阵列，针对每个网格，分别设置一个列表；

第二处理模块，用于当接收到任一用户 X 的客户端上报的位置信息和用户标识后，确定接收到的位置信息所处的网格 Y，并针对用户 X，仅在网格 Y 对应的列表中保存用户 X 的用户标识和最新的位置信息；查
10 找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以网格 Y 为中心的其它网格中的用户， $N = n * n$ ，n 为大于或等于 3 的奇数；根据与用户 X 之间的距离由近到远的顺序对查找出的各用户进行排序，将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端。

9、根据权利要求 8 所述的服务器，其特征在于，所述第二处理模块
15 进一步用于，进行排序之后，确定查找出的用户数是否小于或等于 M，如果是，则将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，否则，仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端，M 为大于 1 的正整数。

10、一种服务器，其特征在于，包括：

20 第一处理模块，用于预先将地球表面划分为一系列等面积的网格阵列，针对每个网格，分别设置一个列表；

第二处理模块，用于当接收到任一用户 X 的客户端上报的位置信息和用户标识后，确定接收到的位置信息所处的网格 Y，并针对用户 X，仅在网格 Y 对应的列表中保存用户 X 的用户标识、最新的位置信息和最
25 新的上报时间；查找出处于网格 Y 以及与网格 Y 构成 N 宫格结构并以

网格 Y 为中心的其它网格中的用户, $N = n * n$, n 为大于或等于 3 的奇数; 综合与用户 X 之间的距离以及上报时间对查找出的各用户进行排序, 将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端; 其中, 与用户 X 之间的距离越近, 排序越靠前, 上报时间距离当前时间越近, 排序越靠前。

11、根据权利要求 10 所述的服务器, 其特征在于, 所述第二处理模块针对查找出的每个用户 i , 分别计算其权值 $A_i = a * D_i + b * T_i$, 其中, a 和 b 均为加权系数, D_i 表示用户 i 与用户 X 之间的距离, T_i 表示当前时间与用户 i 的上报时间之间相距的时长; 按照权值由小到大的顺序对各用户进行排序。

12、根据权利要求 10 或 11 所述的服务器, 其特征在于, 所述第二处理模块进一步用于, 进行排序之后, 确定查找出的用户数是否小于或等于 M , 如果是, 则将排序后的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端, 否则, 仅将排序后处于前 M 位的各用户的用户标识及与用户 X 之间的距离返回给用户 X 的客户端, M 为大于 1 的正整数。

1/3

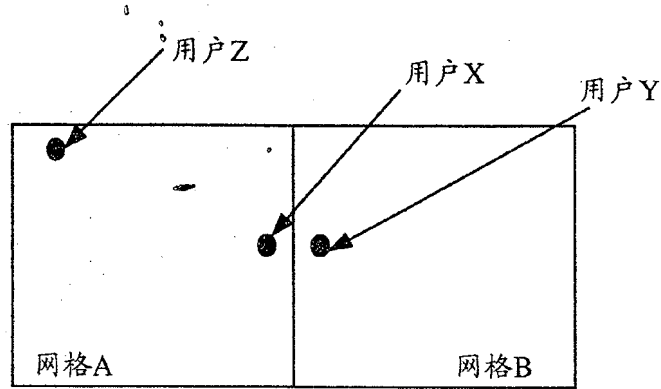


图 1

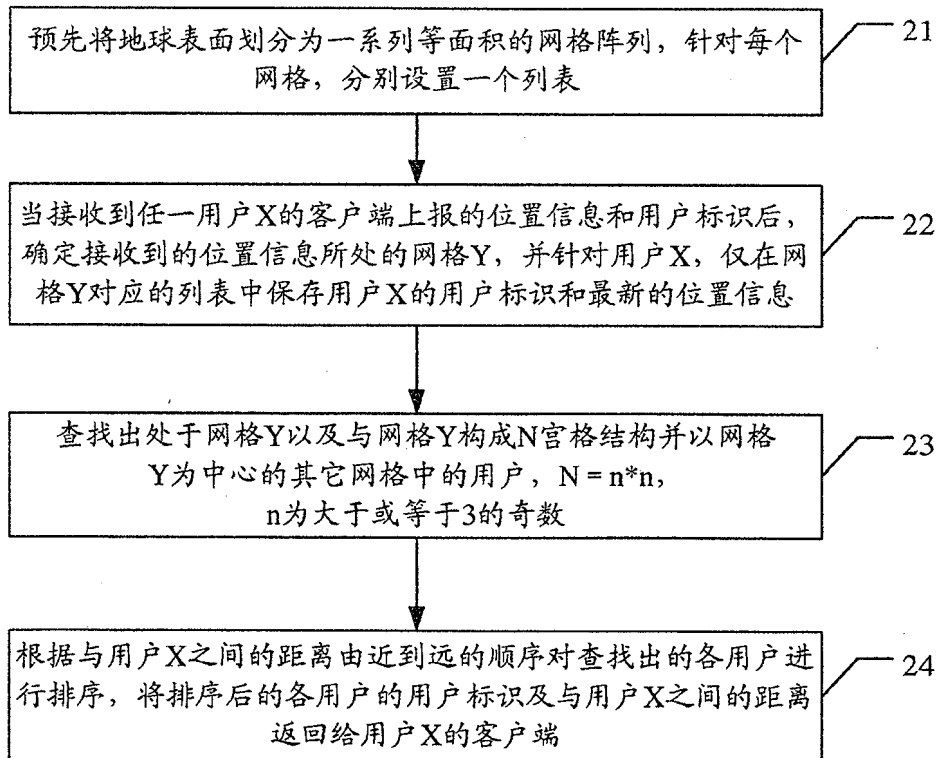


图 2

2/3

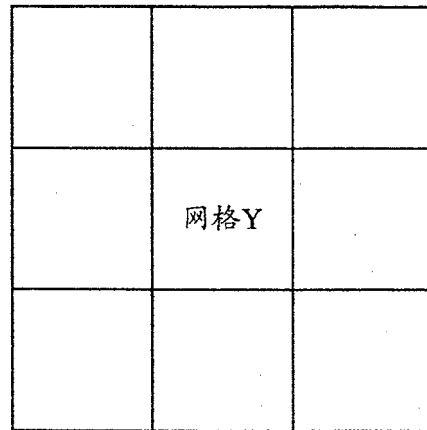


图 3

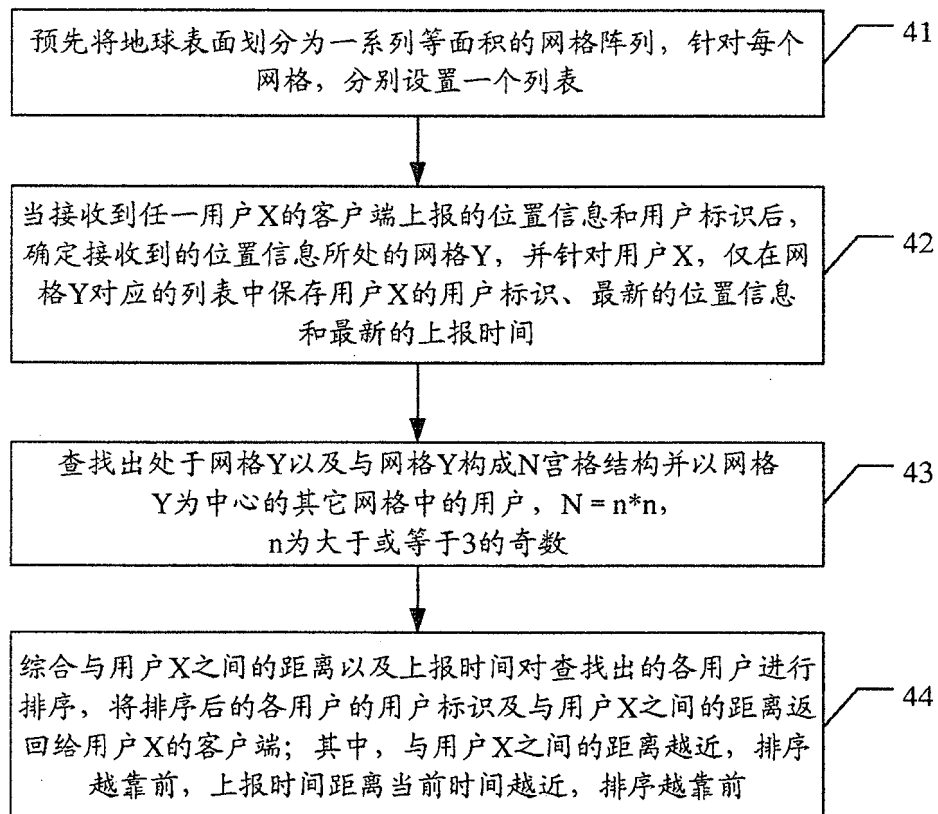


图 4

3/3



图 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/079561

A. CLASSIFICATION OF SUBJECT MATTER				
G06F 17/30 (2006.01) i				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols)				
IPC: G06F, H04L, H04W, G01S, G01C				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)				
CNPAT, CNKI, WPI, EPODOC: search, find, near, around, user, friend, application, area, block, grad, ID, cell phone, mobile phone, terminal				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
PX	CN 102571910 A (TENCENT TECHNOLOGY (SHENZHEN) CO., LTD.) 11 July 2012 (11.07.2012) claims 1-12	1-12		
A	CN 101783080 A (SHENZHEN COSHIP ELECTRONICS CO., LTD.) 21 July 2010 (21.07.2010) description, page 3, paragraph 22 to paragraph 38	1-12		
A	CN 101203041 A (GAO, Jianhong) 18 June 2008 (18.06.2008) the whole document	1-12		
A	CN 1908588 A (BEIHANG UNIVERSITY) 07 February 2007 (07.02.2007) the whole document	1-12		
A	CN 102147261 A (NANCHANG RUIXING SCIENCE AND TECHNOLOGY CO., LTD.) 10 August 2011 (10.08.2011) the whole document	1-12		
A	CN 102162854 A (XIAMEN YAXON NETWORKS CO., LTD.) 24 August 2011 (24.08.2011) the whole document	1-12		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family			
Date of the actual completion of the international search	Date of mailing of the international search report			
18 October 2012 (18.10.2012)	06 December 2012 (06.12.2012)			
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer ZHENG, Ning Telephone No. (86-10) 62413616			

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/079561

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2011/003232 A1 (GOOGLE INC.) 13 January 2011 (13.01.2011) the whole document	1-12

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/079561

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102571910 A	11.07.2012	None	
CN 101783080 A	21.07.2010	HK 1146141 A0	13.05.2011
CN 101203041 A	18.06.2008	None	
CN 1908588 A	07.02.2007	None	
CN 102147261 A	10.08.2011	None	
CN 102162854 A	24.08.2011	None	
WO 2011/003232 A1	13.01.2011	None	

国际检索报告

国际申请号
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<p>A. 主题的分类</p> <p style="text-align: center;">G06F17/30 (2006.01) i</p> <p>按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类</p>																												
<p>B. 检索领域</p> <p>检索的最低限度文献(标明分类系统和分类号)</p> <p style="text-align: center;">IPC: G06F, H04L, H04W, G01S, G01C</p> <p>包含在检索领域中的除最低限度文献以外的检索文献</p> <p>在国际检索时查阅的电子数据库(数据库的名称, 和使用的检索词(如使用))</p> <p>CNPAT, CNKI, WPI, EPODOC: 查找, 查询, 搜索, 附近, 邻近, 周围, 周边, 用户, 朋友, 好友, 应用, 区域, 地区, 网格, 区块, ID, 标识, 手机, 终端, search, find, near, around, user, friend, application, area, block, grad, ID, ccell phone, mobile phone, terminal</p>																												
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(54) **METHOD AND SERVER FOR SEARCHING FOR NEARBY USER IN SOCIAL NETWORK**

(57) Methods and servers for searching for nearby users are provided in the present disclosure. When location information and a user identification (ID) is received from a client terminal device of a user X, a grid Y, to which the location information belongs is determined. The user ID and the location information of the user X is stored in a list of the grid Y. The grid Y is one of grids in a grid array obtained by dividing a surface of the earth into the grids and areas of the grids are the same. Users in the grid Y and other grids are searched. The grid Y and the other grids form an N-grid and the grid Y is a

center of the N-grid. The users are ranked in an ascending order of distances between the users the user X. The ranked user IDs of the users and distances between the users and the user X are sent to the client terminal device of the user X. The ranking may be further performed according to the reporting time. With the methods and devices in the present disclosure, the accuracy of the searching result may be enhanced.

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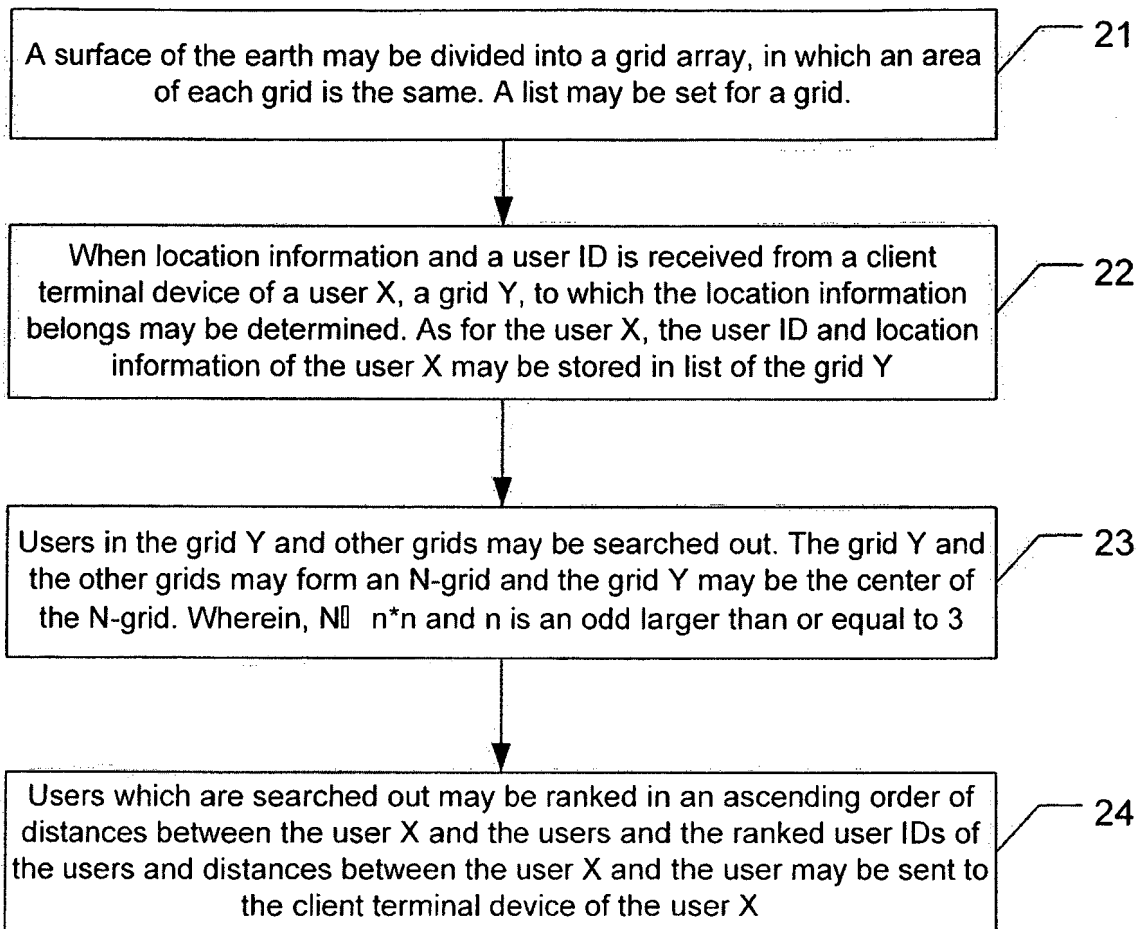


Fig. 2

Description

[0001] This application claims the benefit of priority from Chinese Patent Application, No. 201110363120.4, entitled "Method and Server for Searching for Nearby User in Social Networking Services (SNS)" and filed on November 16, 2011, the entire content of which is hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present disclosure relates to Internet technologies, and more particularly, to methods and servers for searching for nearby users in SNS.

BACKGROUND

[0003] In SNS, a user may search for nearby users and contact with a user to make friends with the user or seek the user's help, etc.

[0004] Nearby users may be searched via following methods. According to longitude and latitude information, a server may divide a surface of the earth in to a grid array, in which the area of each grid may be the same. As for any user X, when the user X needs to search for nearby users, the user X may send his/her location information and a user Identification (ID) to a server via a client terminal device used by the user X. The client terminal device may be a mobile terminal device. The location information may be the longitude and latitude information. After the server receives the location information from the user X, the server first may determine a grid, to which the location information belongs. Then, the server may search for other users in this grid, search for user IDs of the other users and distances between the other users and the user X and send the user IDs and the distances to the client terminal device of the user X.

[0005] However, there are some drawbacks in the above method. The user X may be close to a boundary of two adjacent grids. Figure 1 is a schematic diagram illustrating a location of the user X. As shown in figure 1, two adjacent grids may be grid A and grid B. The user X and user Z are located at the grid A and the user Y is located at the grid B. As for the user X, the distance between the user X and the user Y is shorter than that between the user X and the user Z. If the user X seeks for help, the user Y is obviously a better choice than the user Z. According to an example, the user X may search for the user Z but cannot search for the user Y, resulting in inaccurate searching result.

SUMMARY

[0006] The present disclosure provides methods and servers for searching for nearby users in SNS, to enhance accuracy of a searching result.

[0007] A method for searching for nearby users in Social Networking Services (SNS) includes:

receiving location information and a user Identification (ID) from a client terminal device of a user X; determining a grid Y, to which the location information belongs;

storing the user ID and the location information of the user X in a list of the grid Y; wherein the grid Y is one of grids in a grid array obtained by dividing a surface of the earth into the grids and areas of the grids are the same;

searching for users in the grid Y and other grids; wherein the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$, n is an odd larger than or equal to 3;

ranking the users in an ascending order of distances between the users the user X; and

sending the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X.

[0008] A method for searching for nearby users in Social Networking Services (SNS) includes:

receiving location information and a user Identification (ID) from a client terminal device of a user X; determining a grid Y, to which the location information belongs;

saving the user ID, the location information and reporting time of the user X in a list of the grid Y; wherein the grid Y is one of grids in a grid array obtained by dividing a surface of the earth into the grids and areas of the grids are the same;

searching for users in the grid Y and other grids; wherein the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$, n is an odd larger than or equal to 3;

ranking the users according to distances between the users and the user X and the reporting time of the user X; wherein the closer a distance between a user and the user X, the higher rank of the user is, and the shorter time between the reporting time of the user and a current time is, the higher the rank of the user is; and

sending the ranked user IDs of the users and the distances between the users and the user X to the client terminal device of the user X.

[0009] A server includes:

a first processing module, to divide a surface of the earth into a grid array, in which an area of each grid is the same, and set a list for a grid; and

a second processing module, when location information and a user Identification (ID) from a client terminal device of a user X is received, to determine a grid Y, to which the location information belongs, store the user ID and the location information of the user X in a list of the grid Y, search for users in the grid Y and other grids, in which the grid Y and the

other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$ and n is an odd larger than or equal to 3, rank the users in an ascending order of distances between the users the user X and send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X.

[0010] A server includes:

a first processing module, to divide a surface of the earth into a grid array, in which an area of each grid is the same, and set a list for a grid;
 a second processing module, when location information and a user Identification (ID) from a client terminal device of a user X is received, to determine a grid Y, to which the location information belongs, store the user ID, the location information and reporting time of the user X in a list of the grid Y, search for users in the grid Y and other grids, in which the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$ and n is an odd larger than or equal to 3, rank the users according to distances between the users and the user X and the reporting time of the user X and send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X; wherein the closer a distance between a user and the user X, the higher rank of the user is, and the shorter time between the reporting time of the user and a current time is, the higher the rank of the user is.

[0011] With the technical scheme of the present disclosure, the searching is performed in the grid, at which the user X is located and nearby grids of the grid. The users which are searched out are ranked according to an ascending order of the distances between the users and the user X. Even a user is not located in the above grid, if the distance between the user the user X is short, the user may be searched out and sent to the user X, which may enhance the accuracy of the result of the searching. In addition, in the scheme of the present disclosure, the ranking may be further performed according to the reporting time in addition to the location information and the user ID of the user X. The shorter time between the reporting time of the user and a current time is, the more likely the user X may get in touch with the user and the higher the rank of the user is, which may enhance the accuracy of the searching result.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Figure 1 is a schematic diagram illustrating a location of a user X;

Figure 2 is a flow chart illustrating a first method for searching for nearby users in SNS in accordance with an example of the present disclosure;

Figure 3 is a schematic diagram illustrating a 9-grid formed by a Y grid and nearby grids;

Figure 4 is a flow chart illustrating a second method for searching for nearby users in the SNS in accordance with an example of the present disclosure;

Figure 5 is a schematic diagram illustrating structure of a server in accordance with an example of the present disclosure.

DETAILED DESCRIPTION

[0013] For simplicity and illustrative purposes, the present disclosure is described by referring mainly to non-limiting examples. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present disclosure. It will be readily apparent however, that the present disclosure may be practiced without limitation to these specific details. In other instances, some methods and structures have not been described in detail so as not to unnecessarily obscure the present disclosure. As used throughout the present disclosure, the term "includes" means includes but not limited to, the term "including" means including but not limited to. The term "based on" means based at least in part on. In addition, the terms "a" and "an" are intended to denote at least one of a particular element.

[0014] In order to enhance the accuracy of the searching result, the present disclosure provides a scheme for searching for nearby users.

[0015] Figure 2 is a flow chart illustrating a first method for searching for nearby users in SNS in accordance with an example of the present disclosure. As shown in figure 2, the method includes the following blocks.

[0016] In block 21, a surface of the earth may be divided into a grid array, in which an area of each grid may be the same. A list may be set for a grid. According to an example, a list may be set for each grid.

[0017] According to longitude and latitude information, the surface of the earth may be divided into the grid array, in which the area of each grid may be the same. The area of the grid may be configured as needed, such as one square kilometers.

[0018] The list may be empty at an initial stage.

[0019] In block 22, when location information and a user ID is received from a client terminal device of a user X, a grid Y, to which the location information belongs may be determined. As for the user X, the user ID and location information of the user X may be stored in list of the grid Y.

[0020] The location information may be the longitude and latitude information. Since the grids are divided according to the longitude and latitude information, the grid,

to which the received location information belongs, may be determined.

[0021] For the convenience of description, in various example of the present disclosure, any user may be denoted by the user X and the grid, to which the user X is located is denoted by the grid Y.

[0022] After determining the grid Y, the received user ID and location information may be stored in the list of the grid Y. Therefore, if another user searches for nearby users in the grid Y, the user X may be found.

[0023] It should be noted that the user X may search for nearby users repeatedly. The user ID and the location information may be reported many times. In this example, the user ID and the location information of the user X may be stored in the list of the grid Y to ensure the uniqueness of the user information.

[0024] For example, assume that the user X is in a grid A and reports his/her user ID and location information. The user ID and location information of the user X may be stored in a list of the grid A. Then, if the grid, at which the user X is located, is changed to a grid B, the user X may report his/her user ID and location information again. Therefore, the user ID and location information of the user X stored in the list of the grid A may be deleted and the user ID and the location information of the user X may be stored in the list of the grid B.

[0025] In block 23, users in the grid Y and other grids may be searched out. The grid Y and the other grids may form an N-grid and the grid Y may be the center of the N-grid. Wherein, $N=n*n$ and n is an odd larger than or equal to 3.

[0026] The structure of the N-grid may ensure that users on each direction around the user X may be found.

[0027] The value of n may be determined according to actual requirements. For example, compared with sparsely populated cities, such as Qinghai and Neimenggu, in densely populated cities, such as Guangzhou, Beijing and Shanghai, the value of N may be 5 or 7, etc.

[0028] Figure 3 is a schematic diagram illustrating a 9-grid formed by a Y grid and nearby grids.

[0029] If the N-grid in this block is the 9-grid shown in figure 3, users in the list of the 9-grid may be the users which are searched out, except for the user X.

[0030] In block 24, users which are searched out may be ranked in an ascending order of distances between the user X and the users and the ranked user IDs of the users and distances between the user X and the user may be sent to the client terminal device of the user X.

[0031] Since the location information of the users which are searched out may be known, the location information of the user X may be known. Therefore, the distances between the user X and the users which are searched out may be computed and the ranking of the user may be performed.

[0032] The searching scope in examples of the present disclosure may be enlarged. Therefore, the number of the users which are searched out is increased. For the user X, users ranked lower are basically not concerned.

Therefore, the information of these users needs not to be sent to the user X, which may reduce amount of transmitted data and save bandwidth resources, etc.

[0033] After the ranking is finished, whether the number of users which are searched out is less than or equal to M may be determined. If the number of the users which are searched out is less than or equal to M , the user IDs of the users and the distances between the user X and the users may be sent to the client terminal device of the user X. If the number of the users which are searched out is larger than M , the user IDs of users among top M and the distances between the user X and the users among the top M may be sent to the client terminal device of the user X. M may be a positive integer larger than one. The value of M may be determined according to actual requirements.

[0034] Other information besides the user IDs of the users and the distances between the user X and the users, such as avatars of the users may be sent to the client terminal device of the user X.

[0035] The method for the user X communicating with the user, information of which is returned, may be conventional method.

[0036] Figure 4 is a flow chart illustrating a second method for searching for nearby users in the SNS in accordance with an example of the present disclosure. As shown in figure 4, the method may include following blocks.

[0037] In block 41, a surface of the earth may be divided into a grid array, in which an area of each grid may be the same. A list may be set for a grid.

[0038] In block 42, when location information and a user ID is received from a client terminal device of a user X, a grid Y, to which the location information belongs may be determined. As for the user X, the user ID, location information and reporting time of the user X may be stored in list of the grid Y.

[0039] In block 43, users in the grid Y and other grids may be searched out. The grid Y and the grid may form an N-grid and the grid Y may be the center of the N-grid. Wherein, $N=n*n$ and n may be an odd larger than or equal to 3.

[0040] In block 44, users which are searched out may be ranked according to the distances between the users and the user X and the reporting time and ranked user IDs of the users and distances between the user X and the users may be sent to the client terminal device of the user X. The closer the distance between the user X and a user is, the higher the rank of the user is. The shorter the time between the reporting time of the user and the current time is, the higher the rank of the user is.

[0041] Compared with the example shown in figure 2, when the ranking is performed in this example, the reporting time may be taken into consideration. In block 42, the report time of the user ID and the location information of the user X may be stored in the list of the grid Y.

[0042] In block 44, a weight of a user i $A_i = a * D_i + b * T_i$ may be computed, a and b are weighting coefficients

and values of a and b may be determined as needed. D_i denotes the distance between the user i and the user X. T_i denotes the time between the current time and the reporting time of the user i. The users are ranked in an ascending order of the weight.

[0043] After the ranking is finished, whether the number of users which are searched out is less than or equal to M may be determined. If the number of the users which are searched out is less than or equal to M, the user IDs of the users and the distances between the user X and the users may be sent to the client terminal device of the user X. If the number of the users which are searched out is larger than M, the user IDs of the users among top M and the distances between the user X and the users among the top M may be sent to the client terminal device of the user X. M may be a positive integer larger than one.

[0044] Features of figure 4 which may be the same as those of figure 2 may not be repeated here. Refer to the above description for details of the features.

[0045] In the above two examples, the client terminal device of the user X may obtain the location information of the user X with following methods. That is, the client terminal device of the user X may obtain the location information of the user X via method one to method L. After the location information of the user X is obtained, the client terminal device may report the location information. If the location information of the user X is not obtained with a method, the client terminal device of the user X may obtain the location information with a next method. L may be a positive integer larger than one. As for different methods, the smaller the number is, the higher the accuracy of the location information is.

[0046] The value of L may be three. Method one may be obtaining the location information via a Global Positioning System (GPS) function. Method two may be obtaining the location information via a Cell ID of an eNode B. Method three may be obtaining the location information via a Media Access Control (MAC) address of a connected Wireless Fidelity (WiFi) access point.

[0047] The description of the methods in examples of the present disclosure is finished.

[0048] On the basis of the above description, figure 5 is a schematic diagram illustrating structure of a server in accordance with an example of the present disclosure. As shown in figure 5, the server may include:

[0049] a first processing module, to divide a surface of the earth into a grid array, in which area of each grid may be the same and set a list for a grid; and

[0050] a second processing module, when location information and a user Identification (ID) from a client terminal device of a user X is received, to determine a grid Y, to which the location information belongs, store the user ID and the location information of the user X in a list of the grid Y, search for users in the grid Y and other grids, in which the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$, n is an odd larger than or equal to 3, rank the users in an

ascending order of distances between the users the user X and send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X.

[0051] The second processing module may further determine whether number of the users is less than or equal to M after the users are ranked, send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X if the number of the users is less than or equal to M and send ranked user IDs of users among top M and distances between the users among the top M and the user X to the client terminal device of the user X if the number of the users is larger than M; wherein M may be a positive integer larger than one.

[0052] According to another example of the present disclosure, the server may include:

[0053] a first processing module, to divide a surface of the earth into a grid array, in which an area of each grid may be the same and set a list for a grid;

[0054] a second processing module, when location information and a user Identification (ID) from a client terminal device of a user X is received, to determine a grid Y, to which the location information belongs, store the user ID, the location information and reporting time of the user X in a list of the grid Y, search for users in the grid Y and other grids, in which the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$, n is an odd larger than or equal to 3, rank the users according to distances between the users and the user X and the reporting time of the user X and send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X; wherein the closer a distance between a user and the user X is, the higher rank of the user is, and the shorter time between the reporting time of the user and a current time is, the higher the rank of the user is.

[0055] The second processing module may further compute a weight $A_i = a * D_i + b * T_i$ of a user i; wherein a and b are weighting coefficients, D_i is a distance between the user i and the user X, T_i is time between the current time and the reporting time of the user i and rank the users in an ascending order of the weight.

[0056] The second processing module may further determine whether number of the users is less than or equal to M after the users are ranked, send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X if the number of the users is less than or equal to M and send ranked user IDs of users among top M and distances between the users among the top M and the user X to the client terminal device of the user X if the number of the users is larger than M; wherein M may be a positive integer larger than one.

[0057] The workflow of the device shown in figure 5 may be referred to the description of the above method, which may not be repeated.

[0058] With the technical scheme of the present dis-

closure, the searching is performed in the grid, at which the user X is located and nearby grids of the grid. The users which are searched out are ranked according to an ascending order of the distances between the users and the user X. Even a user is not located in the above grid, if the distance between the user the user X is short, the user may be searched out and sent to the user X, which may enhance the accuracy of the result of the searching. In addition, in the scheme of the present disclosure, the ranking may be further performed according to the reporting time in addition to the location information and the user ID of the user X. The shorter time between the reporting time of the user and a current time is, the more likely the user X may get in touch with the user and the higher the rank of the user is, which may enhance the accuracy of the searching result.

[0059] The foregoing only describes preferred embodiments of the present invention. The protection scope of the present invention, however, is not limited to the above description. Any change or substitution, easily occurring to those skilled in the art, should be covered by the protection scope of the present invention.

Claims

1. A method for searching for nearby users in Social Networking Services (SNS), comprising:

receiving location information and a user Identification (ID) from a client terminal device of a user X;
 determining a grid Y, to which the location information belongs;
 storing the user ID and the location information of the user X in a list of the grid Y; wherein the grid Y is one of grids in a grid array obtained by dividing a surface of the earth into the grids and areas of the grids are the same;
 searching for users in the grid Y and other grids; wherein the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$, n is an odd larger than or equal to 3;
 ranking the users in an ascending order of distances between the users the user X; and
 sending the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X.

2. The method according to claim 1, wherein sending the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X comprises:

determining whether number of the users is less than or equal to M;
 sending the ranked user IDs of the users and distances between the users and the user X to

the client terminal device of the user X if the number of the users is less than or equal to M; and
 sending ranked user IDs of users among top M and distances between the users among the top M and the user X to the client terminal device of the user X if the number of the users is larger than M; wherein M is a positive integer larger than one.

3. The method according to claim 1 or 2, wherein before receiving the location information of the user X, the method further comprises:

obtaining, by the client terminal device of the user X, the location information of the user X according to method one to method L; wherein L is the positive integer larger than one;
 reporting, by the client terminal device of the user X, the location information of the user X if the location information of the user X is successfully obtained with a method; and
 obtaining, by the client terminal device of the user X, the location information of the user X with a next method if the location information of the user X is not successfully obtained with the method; wherein the smaller the L is, the higher accuracy of the location information is.

4. A method for searching for nearby users in Social Networking Services (SNS), comprising:

receiving location information and a user Identification (ID) from a client terminal device of a user X;
 determining a grid Y, to which the location information belongs;
 saving the user ID, the location information and reporting time of the user X in a list of the grid Y; wherein the grid Y is one of grids in a grid array obtained by dividing a surface of the earth into the grids and areas of the grids are the same;
 searching for users in the grid Y and other grids; wherein the grid Y and the other grids form an N-grid and the grid Y is a center of the N-grid, $N=n*n$, n is an odd larger than or equal to 3;
 ranking the users according to distances between the users and the user X and the reporting time of the user X; wherein the closer a distance between a user and the user X, the higher rank of the user is, and the shorter time between the reporting time of the user and a current time is, the higher the rank of the user is; and
 sending the ranked user IDs of the users and the distances between the users and the user X to the client terminal device of the user X.

5. The method according to claim 4, wherein ranking the users according to the distances between the users and the user X and the reporting time of the user X comprises:

5 computing a weight $A_i = a \cdot D_i + b \cdot T_i$ of a user i ;
 wherein a and b are weighting coefficients, D_i is
 a distance between the user i and the user X, T_i
 is time between the current time and the report-
 ing time of the user i ; and
 10 ranking the users in an ascending order of the
 weight.

6. The method according to claim 4, wherein sending the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X comprises:

determining whether number of the users is less
 than or equal to M ;
 20 sending the ranked user IDs of the users and
 distances between the users and the user X to
 the client terminal device of the user X if the
 number of the users is less than or equal to M ;
 and
 25 sending ranked user IDs of users among top M
 and distances between the users among the top
 M and the user X to the client terminal device of
 the user X if the number of the users is larger
 than M ; wherein M is a positive integer larger
 than one.

7. The method according to any of claims 4 to 6, wherein before receiving the location information of the user X, the method further comprises:

obtaining, by the client terminal device of the
 user X, the location information of the user X
 according to method one to method L; wherein
 L is the positive integer larger than one;
 40 reporting, by the client terminal device of the user
 X, the location information of the user X if the
 location information of the user X is successfully
 obtained with a method; and
 45 obtaining, by the client terminal device of the
 user X, the location information of the user X
 with a next method if the location information of
 the user X is not successfully obtained with the
 method; wherein the smaller the L is, the higher
 accuracy of the location information is.

8. A server, comprising:

a first processing module, to divide a surface of
 the earth into a grid array, in which an area of
 each grid is the same, and set a list for a grid; and
 a second processing module, when location in-
 formation and a user identification (ID) from a

client terminal device of a user X is received, to
 determine a grid Y, to which the location infor-
 mation belongs, store the user ID and the loca-
 tion information of the user X in a list of the grid
 Y, search for users in the grid Y and other grids,
 in which the grid Y and the other grids form an
 N-grid and the grid Y is a center of the N-grid,
 $N=n \cdot n$ and n is an odd larger than or equal to 3,
 rank the users in an ascending order of distanc-
 es between the users the user X and send the
 ranked user IDs of the users and distances be-
 tween the users and the user X to the client ter-
 minal device of the user X.

9. The server according to claim 8, wherein the second processing module is further to determine whether number of the users is less than or equal to M after the users are ranked, send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X if the number of the users is less than or equal to M and send ranked user IDs of users among top M and distances between the users among the top M and the user X to the client terminal device of the user X if the number of the users is larger than M ; wherein M is a positive integer larger than one.

10. A server, comprising:

a first processing module, to divide a surface of
 the earth into a grid array, in which an area of
 each grid is the same, and set a list for a grid;
 a second processing module, when location in-
 formation and a user identification (ID) from a
 client terminal device of a user X is received, to
 determine a grid Y, to which the location infor-
 mation belongs, store the user ID, the location
 information and reporting time of the user X in
 a list of the grid Y, search for users in the grid Y
 and other grids, in which the grid Y and the other
 grids form an N-grid and the grid Y is a center
 of the N-grid, $N=n \cdot n$ and n is an odd larger than
 or equal to 3, rank the users according to distanc-
 es between the users and the user X and
 the reporting time of the user X and send the
 ranked user IDs of the users and distances be-
 tween the users and the user X to the client ter-
 minal device of the user X; wherein the closer a
 distance between a user and the user X is, the
 higher rank of the user is, and the shorter time
 between the reporting time of the user and a
 current time is, the higher the rank of the user is.

11. The server according to claim 10, wherein the second processing module is further to compute a weight $A_i = a \cdot D_i + b \cdot T_i$ of a user i ; wherein a and b are weighting coefficients, D_i is a distance between the user i and the user X, T_i is time between the

current time and the reporting time of the user i and rank the users in an ascending order of the weight.

12. The server according to claim 10 or 11, wherein the second processing module is further to determine whether number of the users is less than or equal to M after the users are ranked, send the ranked user IDs of the users and distances between the users and the user X to the client terminal device of the user X if the number of the users is less than or equal to M and send ranked user IDs of users among top M and distances between the users among the top M and the user X to the client terminal device of the user X if the number of the users is larger than M ; wherein M is a positive integer larger than one.

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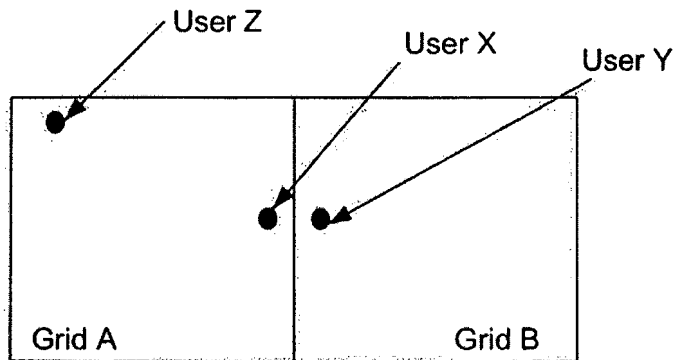


Fig. 1

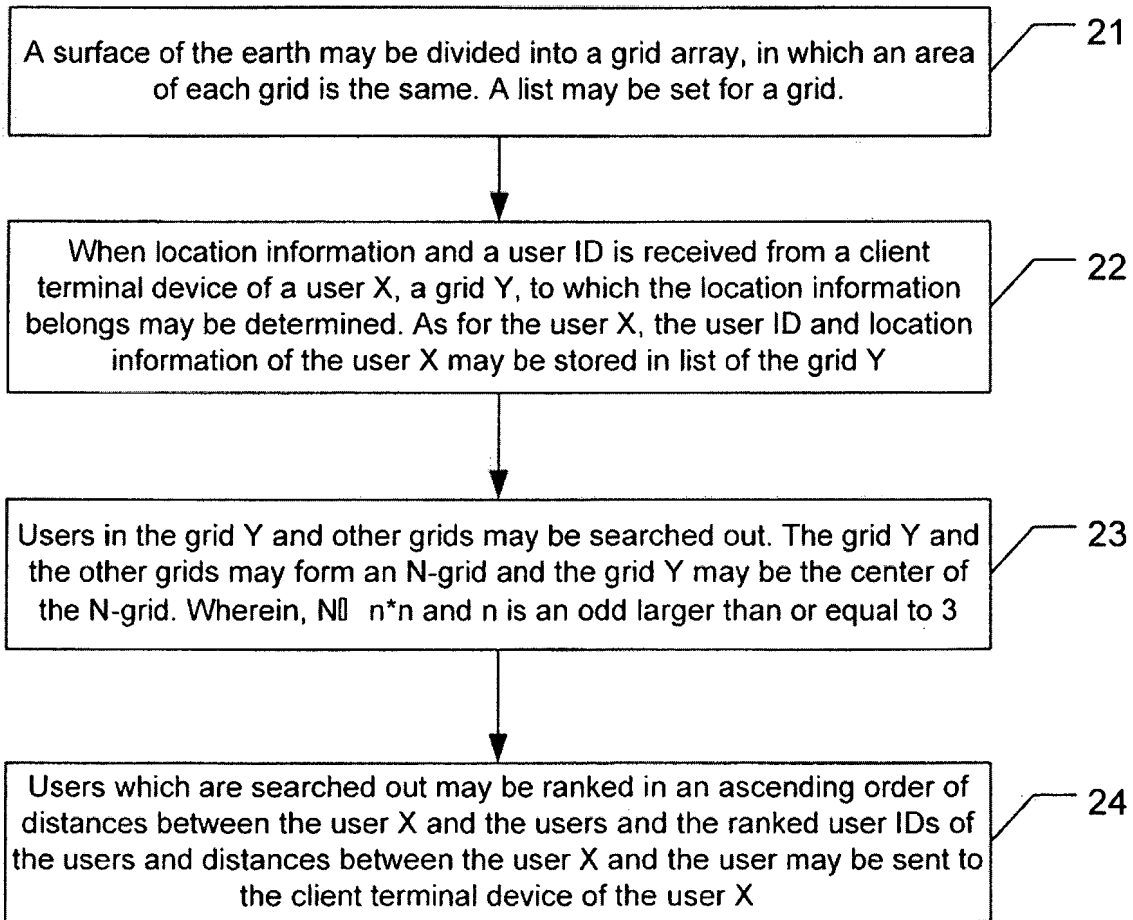


Fig. 2

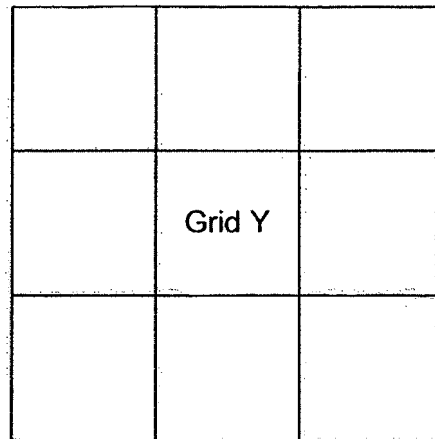


Fig. 3

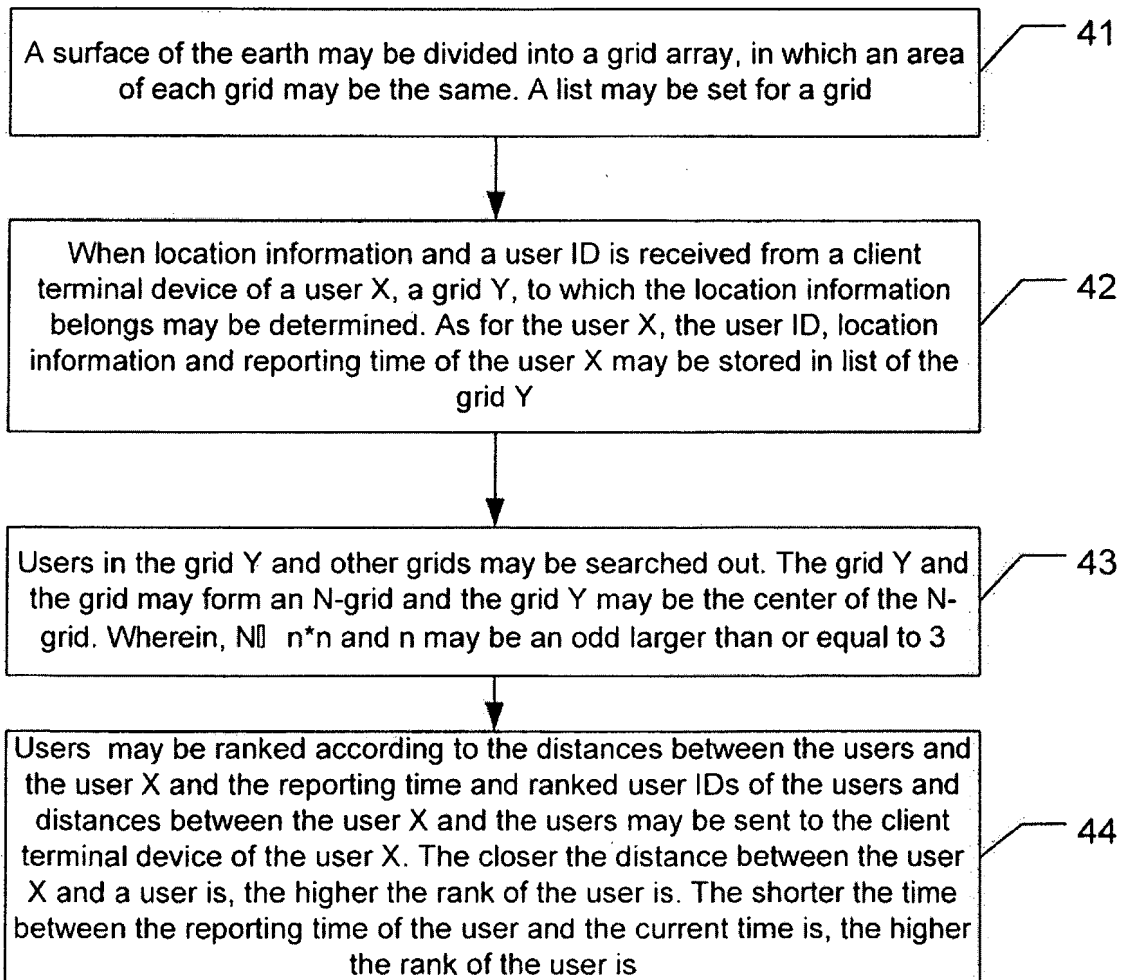


Fig. 4



Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/079561

5 A. CLASSIFICATION OF SUBJECT MATTER		
G06F 17/30 (2006.01) i		
According to International Patent Classification (IPC) or to both national classification and IPC		
10 B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC: G06F, H04L, H04W, G01S, G01C		
15 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
20 CNPAT, CNKI, WPI, EPODOC: search, find, near, around, user, friend, application, area, block, grad, ID, cell phone, mobile phone, terminal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
25 PX	CN 102571910 A (TENCENT TECHNOLOGY (SHENZHEN) CO., LTD.) 11 July 2012 (11.07.2012) claims 1-12	1-12
A	CN 101783080 A (SHENZHEN COSHIP ELECTRONICS CO., LTD.) 21 July 2010 (21.07.2010) description, page 3, paragraph 22 to paragraph 38	1-12
A	CN 101203041 A (GAO, Jianhong) 18 June 2008 (18.06.2008) the whole document	1-12
30 A	CN 1908588 A (BEIHANG UNIVERSITY) 07 February 2007 (07.02.2007) the whole document	1-12
A	CN 102147261 A (NANCHANG RUIXING SCIENCE AND TECHNOLOGY CO., LTD.) 10 August 2011 (10.08.2011) the whole document	1-12
A	CN 102162854 A (XIAMEN YAXON NETWORKS CO., LTD.) 24 August 2011 (24.08.2011) the whole document	1-12
35 <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
40 "A"	document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
45 "O"	document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search		Date of mailing of the international search report
50 18 October 2012 (18.10.2012)		06 December 2012 (06.12.2012)
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451		Authorized officer ZHENG, Ning Telephone No. (86-10) 62413616

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/079561

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2011/003232 A1 (GOOGLE INC.) 13 January 2011 (13.01.2011) the whole document	1-12

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/079561

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CN 102571910 A	11.07.2012	None	
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CN 101203041 A	18.06.2008	None	
CN 1908588 A	07.02.2007	None	
CN 102147261 A	10.08.2011	None	
CN 102162854 A	24.08.2011	None	
WO 2011/003232 A1	13.01.2011	None	

REFERENCES CITED IN THE DESCRIPTION

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摘要

本發明公開了在社交網絡中查找附近用戶的方法和服務器：當接收到任一用戶 X 的客戶端上報的位置信息和用戶標識後，確定接收到的位置信息所處的網格 Y。在網格 Y 對應的列表中保存用戶 X 的用戶標識和位置信息。其中，網格 Y 為預先將地球表面劃分為一系列等面積的網格陣列中的任一個網格。查找出處于網格 Y 以及與網格 Y 構成 N 宮格結構并以網格 Y 為中心的其它網格中的用戶。根據與用戶 X 之間的距離由近到遠的順序對查找出的各用戶進行排序，將排序後的各用戶的用戶標識及與用戶 X 之間的距離返回給用戶 X 的客戶端；在進行排序時，還可進一步考慮上報時間這一因素。應用本發明所述的方法和裝置，能夠提高查找結果的準確性。