processor, a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the linked user identifier based on the interaction location; generating, with at least one processor, a new transaction signature for each linked account identifier based on the new region for each transaction of the plurality of transactions associated with the at least two linked account identifiers, resulting in a plurality of new transaction signatures; generating, with at least one processor, a new interaction signature for the linked user identifier based on the new region for each interaction of the plurality of interactions associated with the linked user identifier, resulting in a new interaction signature; matching, with at least one processor, one new transaction signature of the plurality of new transaction signatures to the new interaction signature; and linking, with at least one processor, one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the one new transaction signature to the new interaction signature.

[0007] In some non-limiting embodiments or aspects, the computer-implemented method may include generating, with at least one processor, a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier; determining, with at least one processor, a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions; determining, with at least one processor, a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location; generating, with at least one processor, a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature; generating, with at least one processor, a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures; matching, with at least one

the geographic area if at least two account identifiers of the plurality of account identifiers are linked to one user identifier of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one transaction initiated with at least one linked account identifier; determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the at least two linked account identifiers based on the transaction location, wherein at least two transactions of the plurality of transactions associated with the at least two linked account identifiers located in the same region are located in different new regions; determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the linked user identifier based on the interaction location; generate a new transaction signature for each linked account identifier based on the new region for each transaction of the plurality of transactions associated with the at least two linked account identifiers, resulting in a plurality of new transaction signatures; generate a new interaction signature for the linked user identifier based on the new region for each interaction of the plurality of interactions associated with the linked user identifier, resulting in a new interaction signature; match one new transaction signature of the plurality of new transaction signatures to the new interaction signature; and link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the one new transaction signature to the new interaction signature.

[0013] In some non-limiting embodiments or aspects, the one or more instructions further cause the at least one processor to: generate a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier; determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions; determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location; generate a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of

[0018] In some non-limiting embodiments or aspects, the one or more instructions further cause the at least one processor to: generate a plurality of new regions within the geographic area if at least two account identifiers of the plurality of account identifiers are linked to one user identifier of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one transaction initiated with at least one linked account identifier; determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the at least two linked account identifiers based on the transaction location, wherein at least two transactions of the plurality of transactions associated with the at least two linked account identifiers located in the same region are located in different new regions; determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the linked user identifier based on the interaction location; generate a new transaction signature for each linked account identifier based on the new region for each transaction of the plurality of transactions associated with the at least two linked account identifiers, resulting in a plurality of new transaction signatures; generate a new interaction signature for the linked user identifier based on the new region for each interaction of the plurality of interactions associated with the linked user identifier, resulting in a new interaction signature; match one new transaction signature of the plurality of new transaction signatures to the new interaction signature; and link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the one new transaction signature to the new interaction signature.

[0019] In some non-limiting embodiments or aspects, the one or more instructions further cause the at least one processor to: generate a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier; determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions; determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier

plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions; determining, with at least one processor, a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location; generating, with at least one processor, a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature; generating, with at least one processor, a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures; matching, with at least one processor, the new transaction signature to one new interaction signature of the plurality of new interaction signatures; and linking, with at least one processor, one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the new transaction signature to the at least one new interaction signature.

[0029] Clause 4: The computer-implemented method of any of clauses 1-3, wherein the transaction data associated with the plurality of transactions comprises a transaction time and/or the mobile application data associated with the plurality of interactions comprises a time of interaction; and wherein generating the transaction signature for each account identifier of the plurality of account identifiers data is further based on the transaction time or generating the interaction signature for each user identifier of the plurality of user identifiers is further based on the time of interaction.

[0030] Clause 5: The computer-implemented method of any of clauses 1-4, wherein matching at least one transaction signature of the plurality of transaction signatures to at least one interaction signature of the plurality of interaction signatures is based on a difference between the transaction time and the time of interaction satisfying a predetermined threshold.

[0031] Clause 6: The computer-implemented method of any of clauses 1-5, at least two account identifiers are linked to one user identifier and/or at least two user identifiers are linked to one account identifier, the method further comprising: shortening, with at least one processor, the predetermined threshold; matching, with

[0035] Clause 10: The system of clauses 8 or 9, wherein the one or more instructions further cause the at least one processor to: generate a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier; determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions; determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location; generate a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature; generate a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures; match the new transaction signature to one new interaction signature of the plurality of new interaction signatures; and link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the new transaction signature to the at least one new interaction signature.

[0036] Clause 11: The system of any of clauses 8-10, wherein the transaction data associated with the plurality of transactions comprises a transaction time and/or the mobile application data associated with the plurality of interactions comprises a time of interaction; and wherein generating the transaction signature for each account identifier of the plurality of account identifiers data is further based on the transaction time or generating the interaction signature for each user identifier of the plurality of user identifiers is further based on the time of interaction.

[0037] Clause 12: The system of any of clauses 8-11, wherein matching at least one transaction signature of the plurality of transaction signatures to at least one interaction signature of the plurality of interaction signatures is based on a difference

plurality of new transaction signatures to the new interaction signature; and link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the one new transaction signature to the new interaction signature.

[0042] Clause 17: The computer program product of clauses 15 or 16, wherein the one or more instructions further cause the at least one processor to: generate a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier; determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions; determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location; generate a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature; generate a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures; match the new transaction signature to one new interaction signature of the plurality of new interaction signatures; and link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the new transaction signature to the at least one new interaction signature.

[0043] Clause 18: The computer program product of any of clauses 15-17, wherein the transaction data associated with the plurality of transactions comprises a transaction time and/or the mobile application data associated with the plurality of interactions comprises a time of interaction; and wherein generating the transaction signature for each account identifier of the plurality of account identifiers data is further based on the transaction time or generating the interaction signature for each user identifier of the plurality of user identifiers is further based on the time of interaction.

the transaction time and the time of interaction may be decreased. After the threshold is decreased, at least one transaction signature may be matched to at least one interaction signature. The matching may be based on the decreased threshold. At least one account identifier associated with the matched transaction signature may be linked to at least one user identifier associated with the matched interaction signature.

[0117] In some non-limiting embodiments or aspects, in response to more than one interaction signature being matched to the same transaction signature, or in response to more than one transaction signature being matched to the same interaction signature, a new set of regions may be generated. Generation of the new set of regions may be used to refine the results such that a single transaction signature can be linked to a single interaction signature. In some non-limiting embodiments or aspects, the new set of regions may be generated such that at least two of the new regions overlap with at least one of the regions associated with a linked transaction signature or a linked interaction signature. In some non-limiting embodiments or aspects, the new set of regions may be generated such that two or more transaction signatures and/or two or more interaction signatures that were located in the same original region are located in at least two different new regions.

[0118] In some non-limiting embodiments or aspects, the new set of regions (e.g., a plurality of new regions) may be generated such that the average size of the new regions is smaller than the average size of the original regions. For example, the new set of regions may contain a higher number of regions than the original set of regions. The new set of regions may split one or more original region into two or more new regions. In some non-limiting embodiments or aspects, at least one of the new regions may be larger than the original regions (e.g., one or more original regions with no transactions or interactions may be combined to make a larger region). In some non-limiting embodiments or aspects, the new set of regions may include the same boundary lines as the original set of regions in addition to new boundary lines for the generation of the new regions.

[0119] Once the new set of regions is generated, the new region for each transaction based on the transaction location is determined. The new region for each interaction based on the interaction location may also be determined. In some non-limiting embodiments or aspects, a new transaction signature and a new interaction signature may be generated based on the new regions associated with each transaction and interaction. In some non-limiting embodiments or aspects, the new

[0131] In some non-limiting embodiments or aspects, the use of the total match score and neighborhoods may provide benefits such as allowing for transactions and interactions that occur at different times, and thus different locations, to still be able to be correlated to each other. The use of the total match score and neighborhoods may also reduce the computational resources necessary to calculate the distance value compared to calculating the distance value using the latitudinal and longitudinal coordinates of each interaction and transaction, thereby improving the speed and efficiency of the computing device.

[0132] Referring now to FIG. 4, FIG. 4 is a diagram of a non-limiting embodiment of a system 400 relating to process 300 shown in FIG. 3. As shown in FIG. 4, the system 400 may include transaction data 401, a transaction processing system 402, mobile application data 403, geographic data 404, and a communication network 412. The transaction processing system 402 may be the same or similar to the transaction processing system 102 described in FIG. 1. The communication network 412 may be the same or similar to the communication network 112 described in FIG. 1.

[0133] With continued referenced to FIG. 4, the transaction processing system 402 may receive mobile application data 403. The mobile application data 403 may be communicated to the transaction processing system 402 through a communication network 412. The mobile application data 403 may be received from cellular phone network providers, merchant systems, issuer systems, mobile application owners, user devices, and/or the like. In some non-limiting embodiments or aspects, the user device may be the same or similar to the customer device 106. Transaction data 401 may be communicated to the transaction processing system 402 through a communication network 412. The transaction data may be received from merchant systems, issuer systems, user devices, electronic wallet provider systems, acquirer systems, and/or the like. The geographic data 404 may include maps, addresses, dimensions, geographic coordinates, and/or the like of a geographic area, such as a city, state, country, and/or the like. The geographic data 404 may be communicated to the transaction processing system 402 through a communication network 412. The geographic data 404 may be received from a third party, such as geographic information systems, a web mapping service, and/or the like.

[0134] With continued reference to FIG. 4, the transaction processing system 402 may generate a plurality of regions within a geographic area based on the geographic data 404. Each region may be associated with a region identifier. The number of

generating, with at least one processor, a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier;

determining, with at least one processor, a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions;

determining, with at least one processor, a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location;

generating, with at least one processor, a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature;

generating, with at least one processor, a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures;

matching, with at least one processor, the new transaction signature to one new interaction signature of the plurality of new interaction signatures; and

linking, with at least one processor, one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the new transaction signature to the at least one new interaction signature.

4. The computer-implemented method of claim 1, wherein the transaction data associated with the plurality of transactions comprises a transaction time and/or the mobile application data associated with the plurality of interactions comprises a time of interaction; and

wherein generating the transaction signature for each account identifier of the plurality of account identifiers data is further based on the transaction time or

link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the one new transaction signature to the new interaction signature.

10. The system of claim 8, wherein the one or more instructions further cause the at least one processor to:

generate a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier;

determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions;

determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location;

generate a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature;

generate a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures;

match the new transaction signature to one new interaction signature of the plurality of new interaction signatures; and

link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the new transaction signature to the at least one new interaction signature.

11. The system of claim 8, wherein the transaction data associated with the plurality of transactions comprises a transaction time and/or the mobile

17. The computer program product of claim 15, wherein the one or more instructions further cause the at least one processor to:

generate a plurality of new regions within the geographic area if one account identifier of the plurality of account identifiers is linked to at least two user identifiers of the plurality of user identifiers, wherein at least two new regions of the plurality of new regions overlap with a region for at least one interaction initiated with at least one linked user identifier;

determine a new region of the plurality of new regions for each interaction of the plurality of interactions associated with the at least two linked user identifiers based on the interaction location wherein at least two interactions of the plurality of interactions associated with the at least two linked user identifiers that are located in the same region are located in different new regions;

determine a new region of the plurality of new regions for each transaction of the plurality of transactions associated with the linked account identifier based on the transaction location;

generate a new transaction signature for the linked account identifier based on the new region for each transaction of the plurality of transactions associated with the linked account identifier, resulting in a new transaction signature;

generate a new interaction signature for each linked user identifier based on the new region for each interaction of the plurality of interactions associated with the at least two linked user identifiers, resulting in a plurality of new interaction signatures;

match the new transaction signature to one new interaction signature of the plurality of new interaction signatures; and

link one account identifier of the plurality of account identifiers to one user identifier of the plurality of user identifiers based on matching the new transaction signature to the at least one new interaction signature.

18. The computer program product of claim 15, wherein the transaction data associated with the plurality of transactions comprises a transaction time and/or the mobile application data associated with the plurality of interactions comprises a time of interaction; and

wherein generating the transaction signature for each account identifier of the plurality of account identifiers data is further based on the transaction time or