APPARATUS AND METHOD FOR CONDUCTING A USER-APPROVED TRANSACTION USING ONE OF A PLURALITY OF ACCOUNTS

FIELD OF INVENTION

[0001] The present invention relates broadly, but not exclusively, to methods for conducting a user-approved transaction using one of a plurality of accounts, particularly accounts linked to an account identifier.

BACKGROUND

[0002] A lot of companies have invested tremendous resources to identify and predict consumer interests so as to learn how consumers may spend their money in the future. If the interests of an individual consumer can be determined, then it is believed that advertising and promotions related to these interests will be more successful in obtaining a positive consumer response, such as purchases of the advertised products or services. Retailers, advertisers, and many other institutions (such as banks) are some of the companies who will benefit from the identification of consumer interests.

[0003] Conventional means of determining consumer interests have generally relied on collecting demographic information about consumers, such as income, age, place of residence, occupation, and so forth, and associating various demographic categories with various categories of interests and merchants. Interest information may be collected from surveys, publication subscription lists, product warranty cards, and myriad other sources. Complex data processing is then applied to the source of data resulting in some demographic and interest description of each of a number of consumers.

[0004] There are various means of determining consumer interests conventionally which include collecting demographic information about consumers, such as income, age, place of residence, occupation, and so forth, and associating various demographic categories with various categories of interests and merchants. Interest information may be collected from surveys, publication subscription lists, product warranty cards, and myriad other sources. Complex data processing is then applied to the source of data resulting in some demographic and interest description of each of a number of consumers.

[0005] One of the problems with this type of conventional technique is that it is not related to time. That is, consumers spend money at merchants which are of interest to them in typically a time related manner. For example, a consumer who is a business traveller spends money on plane tickets, car rentals, hotel accommodations, restaurants, and entertainment all during a single business trip. These purchases together more strongly describe the consumer's true interests and preferences than any single one of the purchases alone. Yet conventional approaches to consumer analysis typically treat these purchases individually and as unrelated in time.

[0006] Another problem with this type of conventional technique is that it is not specific to a consumer. That is, the conventional method typically considers one out of various accounts that a consumer may have.

[0007] The assumption of the conventional method is that consumers will spend money on their interests, as expressed by things like their subscription lists and their demographics. Yet, the data on which the determination of interests is made is typically only indirectly related to the actual spending patterns of the consumer. For example, most publications have developed demographic models of their readership, and offer their subscription lists for sale to others interested in the particular demographics of the publication's readers. But subscription to a

[0001] be in the future. It is important to consider multiple different sources of data from different accounts, such as real-time consumer spending, rentals, digital wallets accounts so as to obtain a more complete collection of data about a specific consumer.

[0002] A need therefore exists to provide methods for conducting a user-approved transaction using one of a plurality of accounts that addresses one or more of the above problems.

[0003] Furthermore, other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background of the disclosure.

SUMMARY

[0004] According to a first aspect, an apparatus for conducting a user-approved transaction using one of a plurality of accounts linked to an account identifier is provided, the apparatus comprising at least one processor; and at least one memory including computer program code; the at least one memory and the computer program code configured to, with at least one processor, cause the apparatus at least to: retrieve historical transaction data, the historical transaction data relating to a plurality of historical transactions conducted using at least one of the plurality of accounts; analyze the retrieved historical transaction data to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period; determine one of the plurality of accounts to be used to be used for conducting the transaction, the determined account having an amount equal to or more than the predicted future transaction amount; conduct the user-approved transaction within the predetermined time period using the determined account; determine a plurality of weights; and assign each of the plurality of weights to the retrieved historical transaction data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period.

[0005] According to a second aspect, a computer-implemented method for conducting a user-approved transaction using one of a plurality of accounts linked to an account identifier, the method comprising retrieving historical transaction data, the historical transaction data relating to a plurality of historical transactions conducted using at least one of the plurality of accounts; analyzing the retrieved historical transaction data to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period; determining one of the plurality of accounts to use for conducting the user-approved transaction, the determined account having an amount equal to or more than the predicted future transaction amount; conducting the user-approved transaction within the predetermined time period using the determined account; and determining a plurality of weights; wherein the step of analysing the retrieved historical transaction data includes assigning each of the plurality of weights to the retrieved historical transaction data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

[0007] Figure 1 shows a block diagram of a transaction system 100 within which transaction data can be received.

[0008] Figure 2 shows a flow chart illustrating a computer-implemented method for conducting a user-approved transaction using one of a plurality of accounts linked to an account identifier according to an example embodiment.

[0009] Figure 3 shows a schematic diagram of a computer system suitable for use in executing the method depicted in Figure 2.

[0010] Figure 4 shows an exemplary computing device to realize a server for the payment network server 108 shown in Figure 1.

[0017] Figure 5 shows exemplary results of applying a mathematical model to analysing historical transaction data depicted in Figure 2.

DETAILED DESCRIPTION

[0018] Embodiments of the present invention will be described, by way of example only, with reference to the drawings. Like reference numerals and characters in the drawings refer to like elements or equivalents.

[0019] Some portions of the description which follows are explicitly or implicitly presented in terms of algorithms and functional or symbolic representations of operations on data within a computer memory. These algorithmic descriptions and functional or symbolic representations are the means used by those skilled in the data processing arts to convey most effectively the substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities, such as electrical, magnetic or optical signals capable of being stored, transferred, combined, compared, and otherwise manipulated.

[0020] Unless specifically stated otherwise, and as apparent from the following, it will be appreciated that throughout the present specification, discussions utilizing terms such as "scanning", "calculating", "determining", "replacing", "generating", "initializing", "outputting", "receiving", "retrieving", "identifying", "predicting" or the like, refer to the action and processes of a computer system, or similar electronic device, that manipulates and transforms data represented as physical quantities within the computer system into other data similarly represented as physical quantities within the computer system or other information storage, transmission or display devices.

[0021] The present specification also discloses apparatus for performing the operations of the methods. Such apparatus may be specially constructed for the required purposes, or may comprise a computer or other device selectively activated or reconfigured by a computer program stored in the computer. The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various machines may be used with programs in accordance with the teachings herein. Alternatively, the construction of more specialized apparatus to perform the required method steps may be appropriate. The structure of a computer will appear from the description below.

[0022] In addition, the present specification also implicitly discloses a computer program, in that it would be apparent to the person skilled in the art that the individual steps of the method described herein may be put into effect by computer code. The computer program is not intended to be limited to any particular programming language and implementation thereof. It will be appreciated that a variety of programming languages and coding thereof may be used to implement the teachings of the disclosure contained herein. Moreover, the computer program is not intended to be limited to any particular control flow. There are many other variants of the computer program, which can use different control flows without departing from the spirit or scope of the invention.

[0023] Furthermore, one or more of the steps of the computer program may be performed in parallel rather than sequentially. Such a computer program may be stored on any computer readable medium. The computer readable medium may include storage devices such as magnetic or optical disks, memory chips, or other storage devices suitable for interfacing with a computer. The computer readable medium may also include a hard-wired medium such as exemplified in the Internet system, or wireless medium such as exemplified in the GSM mobile telephone system. The computer program when loaded and executed on such a computer effectively results in an apparatus that implements the steps of the preferred method.

[0024] Various embodiments of the present invention relate to methods for conducting a user-approved transaction using one of a plurality of accounts, particularly accounts linked to an account identifier. In an embodiment, the method is a computer-implemented method which conducting a user-approved transaction using one of a plurality of accounts linked to an account identifier, the method comprises retrieving historical transaction data, the historical transaction data relating to a plurality of historical transactions conducted using at least one of the plurality of accounts; analyzing the retrieved historical transaction data to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period; determining one of the plurality of accounts to be used to be used for conducting the transaction, the determined account having an amount equal to or more than the predicted future transaction amount; and conducting the user-approved transaction within the predetermined time period using the determined account.

[0025] In the following description, a payment card is a card that can be used by an account holder for a transaction with a merchant. In the following description, the term "payment cards" refer to any suitable transaction cards, such as credit cards, debit cards, prepaid cards, charge cards, membership cards, promotional cards, frequent flyer cards, identification cards, gift cards, and/or any other device that may hold payment account information, such as mobile phones, Smartphones, personal digital assistants (PDAs), key fobs, and/or computers. Each type of payment card can be used as a method of payment for performing a transaction.

[0026] In the following description, a digital wallet is an account that can be used by a digital wallet user for a transaction with a merchant. The digital wallet is usually linked to a digital wallet user's bank account or a digital wallet user's payment card. Typically, the payments by digital wallets are facilitated by a different entity such as Google®, Apple® or Paypal®. Additionally or alternatively, the payments by digital wallets are facilitated by an entity who also managed the payment cards such as MasterCard®. Such transactions that are made using the digital wallets are also known as wallet-based transactions.

[0027] In the following description, an account holder (or a customer) may refer to either a payment card user or a digital wallet user. In specific embodiments, the payment card user may also be a digital wallet user. For example, a payment card user may register his payment card to a digital wallet account which qualifies the payment card user as a digital wallet user. The account holder is a customer who initiates a transaction with a merchant. In one example, the customer may initiate the transaction with the merchant to buy goods and/or services from the merchant using his payment card. In another example, the customer may initiate the transaction with one merchant to buy goods and/or services from another merchant using his digital wallet. In an embodiment, the transaction is a payment transaction. In other words, completion of the transaction involves a payment between parties to the transaction. Completion of the transaction may also be known as conducting a transaction.

[0028] FIG 1 illustrates a block diagram of a transaction system 100 within which transaction data can be received.

[0029] The system 100 comprises a transaction device 102 in communication with a merchant device 104. The transaction device 102 may also be in direct communication with a payment network server 108, without having to communicate with the merchant device 104. In specific embodiments, the transaction device 102 may also be in direct communication with a wallet-based network server 114, without having to communicate with the merchant device 104.

[0030] The merchant device 104 is in communication with an acquirer server 106. The acquirer server 106, in turn, is in communication with the payment network server 108 and the wallet-based network server 114. The payment network server 108, in turn, is in communication with an issuer server 110. In specific embodiments, the acquirer server 106 may also be in communication with the wallet-based network server 114 which is in communication with the issuer server 110.

[0031] Use of the term 'server' herein can mean a single computing device or a plurality of interconnected computing devices which operate together to perform a particular function. That is, the server may be contained within a single hardware unit or be distributed among several or many different hardware units.

[0032] The transaction device 102 typically is associated with a customer (or user) who is a party to a transaction that occurs between the transaction device 102 and the merchant device 104 through a transaction. The transaction device 102 may be a fixed (wired) computing device or a wireless (portable) computing device. In specific implementations, the transaction device 102 may be a handheld or portable or mobile device carried or used by the customer, or may refer to other types of electronic devices such as a personal computer, a land-line telephone or an interactive voice response (IVR) system and the like. The mobile device may be a device, such as a mobile phone, a laptop computer, a personal digital computer (PDA), a mobile computer, a portable music player (such as an iPod™ and the like).

[0033] The merchant device 104 typically is associated with the merchant who is also a party to the transaction that occurs between transaction device 102 and the merchant device 104 through the transaction. The merchant device 104 may be a point-of-sale (POS) terminal, an automatic teller machine (ATM), a personal computer, a computer server (hosting a website, for example), an IVR system, a land-line telephone, or any type of mobile device such as a mobile phone, a personal digital assistant (PDA), a laptop computer, a tablet computer and the like.

[0034] The acquirer server 106 generally is associated with an acquirer who may be an entity (e.g. a company or organization) which issues (e.g. establishes, manages, administers) a transaction credential or an account (e.g. a financial bank account) of the merchant. Examples of the acquirer include a bank and/or other financial institution. As stated in the above, the acquirer server 106 may include one or more computing devices that are used to establish communication with another server by exchanging messages with and/or passing information to the other server.

[0035] The payment network server 108 typically is associated with a payment facilitator. For example, the payment network server 108 may be the Banknet® network operated by MasterCard®. The payment facilitator (e.g. MasterCard®) may be an entity (e.g. a company or organization) who operates to process transactions, clear and settle funds for payments between two entities (e.g. two banks). The payment network server 108 may include one or more computing devices that are used for processing transactions. An exemplary payment network server 108 is shown in Figure 4.

[0036] The wallet-based network server 114 typically is associated with a wallet-based facilitator. For example, the wallet-based network server 108 may be a server operated by Google®, Apple® or Paypal®. The wallet-based facilitator (e.g. Google®, Apple® or Paypal® may be an entity (e.g. a company or organization) who operates to process wallet-based transactions, clear and settle funds for payments between two entities (e.g. two banks) in a wallet-based environment. The wallet-based network server 114 may include one or more computing devices that are used for processing transactions.

[0037] The issuer server 110 generally is associated with an issuer and may include one or more computing devices that are used to perform a payment transaction. The issuer may be an entity (e.g. a company or organization) which issues (e.g. establishes, manages, administers) a transaction credential or an account (e.g. a financial bank account). An account may be associated with a plurality of transaction devices 102.

[0038] The payment network server 108 may be configured to communicate with, or may include, a database (or a transaction database) 109. The transaction database 109 stores data corresponding to a transaction (or transaction data). Examples of the data include Transaction ID, Merchant ID, Merchant Name, MCC / Industry Code, Industry Description, Merchant Country, Merchant Address, Merchant Postal Code, Aggregate Merchant ID. For example, data ("Merchant name" or "Merchant ID") relating to the merchant, time and date for which the

goods/ services relating to the transaction will be delivered are included in the database 109. In other embodiments, the payment network server 108 may also be configured to communicate with, or may include, another database 140. The database 140 may include data corresponding to a payment card user. Examples of the data include name, age group, income group, address, gender or the like relating to the payment card user. Further details on how these data are managed are described in Figure 2 below.

[0039] The transaction device 102 is capable of wireless communication using a suitable protocol with the merchant device 104. For example, embodiments may be implemented using transaction devices 102 that are capable of communicating with WiFi / Bluetooth-enabled merchant devices 104. It will be appreciated by a person skilled in the art that depending on the wireless communication protocol used, appropriate handshaking procedures may need to be carried out to establish communication between the transaction device 102 and the merchant device 104. For example, in the case of Bluetooth communication, discovery and pairing of the transaction device 102 and the merchant device 104 may be carried out to establish communication.

[0040] In an example, during a payment card transaction, a transaction request message 112 is generated at the transaction device 102. The transaction request message 112 is generated by the transaction device 102 in response to the customer (or payment card user) making a selection of a good and/or service to be purchased from the merchant. In other words, the transaction request message relates 112 to a transaction between the payment card user and the merchant. The transaction may be performed via a website of the merchant. In specific implementations, transaction device 102 may be fitted with a wireless communications interface such as a Near Field Communication (NFC) interface to enable the transaction device 102 to electronically communicate with the merchant device 104 to perform the transaction. NFC is a set of standards to establish radio communication between devices by bringing them into close proximity such as

only a few centimetres. NFC standards cover communication protocols and data exchange formats, and are based on radio-frequency identification (RFID) technology.

[0041] Each transaction data relates to a transaction and identifies the payment card user and the merchant, generally by way of identifiers of each associated with the payment card user and merchant respectively. Further, the transaction data may also identify the good and/or service to be purchased and a type or nature of the transaction. The transaction data may further identify a value or price of the good and/or service (e.g., a transaction amount) and a location where the good and/or service will be delivered. The transaction data may also indicate a time and date at which the transaction was initiated by the payment card user.

[0042] The wallet-based network server 114 may be configured to communicate with, or may include, a database 118. The database 118 stores data corresponding to each digital wallet registered by the digital wallet user and data corresponding to a transaction. Examples of the data include data relating to the payment card used to register the digital wallet.

[0043] In another example, during a wallet-based transaction, a wallet-based transaction request message 116 is generated at the transaction device 102. The wallet-based transaction request message 116 is generated by the transaction device 102 in response to the customer (or digital wallet user) making a selection of a good and/or service to be purchased from the merchant. In other words, the wallet-based transaction request message 116 relates to a wallet-based transaction between the digital wallet user and the merchant. The transaction may be performed via a website of the merchant. Similar to the transaction request message 112, the wallet-based transaction message 116 may include an indicator relating to the transaction device and/or the transaction data.

[0044] The following types of transaction data may be included in the transaction request message 112 or the wallet-based transaction request message 116:

Transaction level information:-

- Transaction ID
- Account ID (anonymized)
- Merchant ID
- Transaction Amount
- Transaction Local Currency Amount
- Date of Transaction
- Time of Transaction
- Type of Transaction
- Date of Processing
- Cardholder Present Code
- Merchant Category Code (MCC)

Account (or Profile) Information:-

- Account ID (anonymized)
- Card Group Code
- Card Product Code
- Card Product Description
- Card Issuer Country
- Card Issuer ID
- Card Issuer Name
- Aggregate Card Issuer ID
- Aggregate Card Issuer Name

Merchant Information:-

- Merchant ID

- Merchant Name
- MCC / Industry Code
- Industry Description
- Merchant Country
- Merchant Address
- Merchant Postal Code
- Aggregate Merchant ID
- Aggregate Merchant Name
- Merchant Acquirer Country
- Merchant Acquirer ID

Issuer Information:-

- Issuer ID
- Issuer Name
- Aggregate Issuer ID
- Issuer Country

[0045] The transaction request message 112 or the wallet-based transaction request message 116 is sent from the transaction device 102 to the merchant device 104. In a disclosed embodiment, for example, where the transaction is being performed at the website of the merchant, the transaction device 102 and the merchant device 104 are in communication with a network, such as, the Internet (not shown for the sake of simplicity). In this example, the transaction request message 112 or the wallet-based transaction request message 116 is sent from the transaction device 102 to the merchant device 104 via the network.

[0046] As mentioned above, the role of the payment network server 108 or the wallet-based network server 114 is to facilitate communication between the acquirer server 106 and the issuer server 110. Therefore, the payment network server 108 or the wallet-based network server 114

may serve as a means through which the acquirer server 106 may communicate with the issuer server 110 in a manner that payments and authentication may be performed. In specific implementations, the payment network server 108 or the wallet-based network server 114 may receive transaction data when settling a transaction for a consumer and subsequently store / update the transaction data in the database 109 or the database 118, respectively.

[0047] The wallet-based network server 114 may be different and separate from the payment network server 108. Alternatively, the wallet-based network server 114 may be part of the payment network server 108. In specific implementations, the payment network server 108 is further configured to perform additional operations. For example, the payment network server 108 may be configured to update the database 109 whenever a payment card user registers his payment card to a digital wallet account. Additionally, the payment network server 108 may also be configured to determine which accounts to use for a user-approved transaction based on an analysis of the historical transaction data.

[0048] The transaction authorization process described above involves multiple parties (e.g., account holder, merchant, acquirer, issuer, payment facilitator). However, the transaction authorization process may be essentially viewed as a transaction between an account holder (or a user) and a merchant (with the other parties facilitating the transaction).

[0049] Figure 2 shows a flow chart 200 illustrating a computer-implemented method for conducting a user-approved transaction using one of a plurality of accounts, particularly, a plurality of accounts linked to an account identifier according to an example embodiment. The account identifier may refer to, among other things, an identifier that identifies an account holder (or user) who owns the plurality of accounts.

[0050] Referring to Figure 2, at step 202, historical transaction data, which are conducted using a plurality of accounts, will be retrieved. The plurality of accounts is linked to an account identifier. This can be done by referring to the profile information of the user that is registered

with each of the corresponding account. In an implementation, the method is implemented to determine one out of a plurality of accounts that belong to a single user (or account holder). Each of the plurality of accounts is accompanied with an account identifier that identifies the account holder. The determined account will be used to conduct a transaction (or user-approved transaction) that is approved by the user

[0051] In order to do so, the payment network server 108 refers to one or more databases that stores the account characteristics of the users so as to identify all accounts that have the same account identifier. The accounts, include among other things, a payment card account and a digital wallet user. The account characteristics of the users that are stored contains, among other information, the name, age group, income group, address, gender, PIN or mobile number that is used to register the account or the like relating to the users. In an embodiment, the account characteristic is based on the account holder and the account identifier is determined based on the account characteristic.

[0052] Based on the account characteristic, a plurality of accounts having the account characteristic can be identified. For example, a plurality of payment card accounts and/or a plurality of digital wallet accounts can be identified by referring to the corresponding mobile number that is used to registered for each of the account.

[0053] Once the plurality of accounts are identified, a plurality of historical transaction data relating to a plurality of historical transactions conducted for a plurality of accounts is retrieved by the payment network server 108 by querying the transaction database 109. In an embodiment, the step of retrieving historical transaction data is done periodically. In the following description, “current transaction” refers to a transaction that is being conducted, which is meant to be differentiated from “historical transactions” which relates to transactions that were already conducted or initiated prior to the current transaction. Additionally, or alternatively, the

current transaction may also relate to a dynamic data; that is, one that is recently added. The historical transaction data relates to fixed transaction data (e.g., rentals, mortgages) that are completed or conducted on a periodic basis.

[0054] After step 202 is performed, step 204 may be performed. Step 204 involves analysing the retrieved historical transaction data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period. This may involve identifying, from the retrieved historical transaction data, transaction information of the identified account to derive purchasing behaviour of the identified plurality of accounts within the predetermined time period. For example, the historical transaction data may be retrieved and analysed to predict an amount to be made by at least one of the plurality of accounts within the next month. The transaction information includes, among other information, the transaction amount. The transaction amount gives an indication of how much the plurality of accounts are typically used in each transaction category. Transaction categories can refer to an industry-type of a merchant or a location of a merchant. This helps to derive the purchasing behaviour of the user associated with the plurality of accounts. For example, a user who owns the plurality of accounts typically spends about US$5,000 within a month on rentals, transport, grocery and food. It can be predicted that he would spend US$5,000 in the next month.

[0055] As mentioned in the above, the transaction categories include, among other information, the identity of the merchant (e.g., Merchant ID and/or industry-type). As such, the merchants with whom the identified payment card users have made prior transactions can be identified based on the corresponding identities of the merchant in the historical transaction data. This makes it possible to further analyse the types of the merchants with whom the payment card users tend to initiate transactions and the time period during which such transactions are made. For example, the user tends to spend US$5,000 within a month. This amount includes US$2,000 on rental which is usually paid at the beginning of the month. In the event, a future transaction amount is to be predicted in the next two weeks which does not coincide with the beginning of

the month, the amount of US$2,000 to be paid to the landlord (identified based on the Merchant ID) will not be factored in.

[0056] If necessary, various algorithms / rules will be applied to do the analysis. In various embodiments, a mathematical model is applied to the historical transaction data so as to analyse the data. For example, the data is trained to predict an amount that may be spent using at least one of the plurality of accounts. In an example, the mathematical model comprises, among other examples, fuzzy logic and a regression model. A person skilled in the art will understand that the fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual "true or false" (1 or 0) Boolean logic on which the modern computer is based. In an embodiment, the retrieved historical data are analysed and a plurality of weights are determined. The determined weights are then assigned to the retrieved historical data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period. More information can be found in Fig. 5.

[0057] In an embodiment, the payment network server 108 updates a database 109 when an additional transaction or a current transaction is made using at least one of the plurality of accounts. For example, the database 109 is updated when the user buys a coffee using one of his payment card. The transaction relating to the coffee is a current transaction or an additional transaction. In this example, retrieving the historical transaction data includes retrieving the additional transaction data and analysing the retrieved transaction data includes analysing the additional transaction data.

[0058] After step 204 is performed, step 206 may be performed. Step 206 involves determining one of the plurality of accounts to use for conducting the user-approved transaction. In order to conduct the transaction involving the predicted future transaction amount determined in step 204, the account should have an amount equal to or more than the predicted future transaction amount. For example, if it is determined that the user is predicted to spend US$5,000 within the

next month, step 206 involves determining an account belonging to the user that has US$5,000 or more. A person skilled in the art will understand that the account includes, among other things, a credit card, a debit card and a digital wallet account and the amount includes one that is existing in the account or on credit.

[0059] Additionally or alternatively, the respective locations of the merchants may be taken into consideration in step 206. The respective locations of the merchants can be obtained by referring to the transaction database 109 having stored thereon the location (e.g. postal address, latitude/longitude) of each merchant in association with the merchant ID. In this context, geographical location data of the merchant may include latitude and longitude coordinates and a postal address. The latitude and longitude coordinates may be in any suitable format, such as: (i) Degrees, minutes, and seconds (DMS), (ii) Degrees and decimal minutes (DMM), and (iii) Decimal degrees (DD). The purchasing behaviour of the account holder can be identified based on the location of the merchants with whom they have prior transactions. For example, if the account holder is expected to travel to a different country, an account that is authorised to be used in that country will be determined if it has an amount equal to or more than the predicted future transaction amount.

[0060] Typically, account holders tend to have a similar spending habit or purchasing behaviour when they are on vacation or business trip. Based on this assumption, the purchasing behaviour of account holder is taken into consideration in this step so as to determine an account to be used.

[0061] After step 206 is performed, step 208 may be performed. Step 208 involves conducting the user-approved transaction within the predetermined time period using the determined account. The account that has been determined in step 206. In the steps prior to step 208, a future transaction amount to be spent and the account to be used are determined. For example, if it is predicted that the account holder will spend US$5,000 within the next one month, the next

transaction that is initiated by the account holder (or user-approved transaction) will be conducted using the determined account. This may apply for the entire predetermined time period. That is, the determined account will be used for the next one month period. This also apply if the next transaction is related to an amount that is less than the predicted future transaction amount.

[0062] In an embodiment, there may be unexceptional transactions that use the determined account causing the amount or funds in the determined account to become less than the future transaction amount. In such instances, the method further comprises transferring funds from other accounts to the determined account so that the amount in the determined account is equal to or more than the future transaction amount.

[0063] In specific implementations, the historical transaction data of a plurality of payment card users are retrieved and analysed by the payment network server 108. In this way, an individual's particular spending habits are not scrutinised and the anonymity of the payment card users is maintained. Additionally, the payment network server 108 is configured to use factual and time-sensitive historical transaction data to create mathematical models to analyse historical transaction data of a plurality of accounts.

[0064] As mentioned in the background, it is difficult or impossible to consolidate the historical transaction data of the digital wallet users. The predicted purchasing behaviour of the digital wallet users allows the payment network server 108 to accurately predict their future spending behaviour and hence, effectively allocates the resources.

[0065] In an implementation, the payment network server 108 is configured to allocate resources to promote or advertise merchants of a specific industry-type that the digital wallet users prefer. In another implementation, the payment network server 108 is configured to allocate resources to

promote or advertise merchants in a specific location where the digital wallet users tend to prefer as described in step 210.

[0066] By the same token, the payment network server 108 may be configured to rank the accounts in a manner that is consistent with the purchasing behaviour of the user. For example, if it has been recognised that the user uses an amount at merchants who sell groceries towards the end of the month, the payment network server 108 may rank accounts that provide promotions relating to these merchants higher than other accounts, so as to promote spending.

[0067] Additionally, the payment network server 108 may be configured to update the database 109 when settling a current transaction. This helps to keep the transaction data relevant and updated. The payment network server 108 may also be configured to update the database 109 when a consumer (e.g., a payment card user) registers or links a payment card to a digital wallet account by way of using an account identifier.

[0068] Figure 5 shows exemplary results of applying a mathematical model to analysing historical transaction data depicted in Figure 2. Figure 5A shows a graph depicting transaction amounts that are spent against a time axis. In Figure 5A, the total amount that is spent over a period of six weeks is represented by line 502, the estimated amount is represented by 506 which may be obtained by line 504. In Figures 5B-5F, it is shown how the points in line 504 may be calculated in a table.

[0069] Figure 5 shows exemplary results of a dispensing pattern for an ATM on which a regression model has been applied. It illustrates how the regression model can be used for predicting the dispensing pattern at the ATM.

[0070] As illustrated in Figure 5B, the dispensing pattern for the ATM is observed over a period of time. The dispensing amount are depicted in the excel sheet as calculation points which are subsequently be analysed to predict a future dispensing pattern.

[0071] It's a predictive analysis method (e.g, statistical models like regression, time series) which may be used to decipher the patterns of consumer spends to provide an objective analysis.

[0072] Figure 3 depicts an exemplary computer / computing device 300, hereinafter interchangeably referred to as a computer system 300, where one or more such computing devices 300 may be used to facilitate execution of the above-described method for providing a travel recommendation to a user. In addition, one or more components of the computer system 300 may be used to realize the computer 302. The following description of the computing device 300 is provided by way of example only and is not intended to be limiting.

[0062] As shown in Figure 3, the example computing device 300 includes a processor 304 for executing software routines. Although a single processor is shown for the sake of clarity, the computing device 300 may also include a multi-processor system. The processor 304 is connected to a communication infrastructure 306 for communication with other components of the computing device 400. The communication infrastructure 306 may include, for example, a communications bus, cross-bar, or network.

[0063] The computing device 300 further includes a main memory 308, such as a random access memory (RAM), and a secondary memory 310. The secondary memory 310 may include, for example, a storage drive 312, which may be a hard disk drive, a solid state drive or a hybrid drive and/or a removable storage drive 314, which may include a magnetic tape drive, an optical disk drive, a solid state storage drive (such as a USB flash drive, a flash memory device, a solid state drive or a memory card), or the like. The removable storage drive 314 reads from and/or writes to a removable storage medium 344 in a well-known manner. The removable storage medium 344 may include magnetic tape, optical disk, non-volatile memory storage medium, or the like, which is read by and written to by removable storage drive 314. As will be appreciated by persons skilled in the relevant art(s), the removable storage medium 344 includes a computer

readable storage medium having stored therein computer executable program code instructions and/or data.

[0064] In an alternative implementation, the secondary memory 310 may additionally or alternatively include other similar means for allowing computer programs or other instructions to be loaded into the computing device 300. Such means can include, for example, a removable storage unit 322 and an interface 340. Examples of a removable storage unit 322 and interface 340 include a program cartridge and cartridge interface (such as that found in video game console devices), a removable memory chip (such as an EPROM or PROM) and associated socket, a removable solid state storage drive (such as a USB flash drive, a flash memory device, a solid state drive or a memory card), and other removable storage units 322 and interfaces 340 which allow software and data to be transferred from the removable storage unit 322 to the computer system 300.

[0065] The computing device 300 also includes at least one communication interface 324. The communication interface 324 allows software and data to be transferred between computing device 300 and external devices via a communication path 326. In various embodiments of the inventions, the communication interface 324 permits data to be transferred between the computing device 300 and a data communication network, such as a public data or private data communication network. The communication interface 324 may be used to exchange data between different computing devices 300 which such computing devices 300 form part an interconnected computer network. Examples of a communication interface 324 can include a modem, a network interface (such as an Ethernet card), a communication port (such as a serial, parallel, printer, GPIB, IEEE 1394, RJ25, USB), an antenna with associated circuitry and the like. The communication interface 324 may be wired or may be wireless. Software and data transferred via the communication interface 324 are in the form of signals which can be electronic, electromagnetic, optical or other signals capable of being received by communication

interface 324. These signals are provided to the communication interface via the communication path 326.

[0066] As shown in Figure 3, the computing device 300 further includes a display interface 302 which performs operations for rendering images to an associated display 330 and an audio interface 332 for performing operations for playing audio content via associated speaker(s) 334.

[0067] As used herein, the term "computer program product" may refer, in part, to removable storage medium 344, removable storage unit 322, a hard disk installed in storage drive 312, or a carrier wave carrying software over communication path 326 (wireless link or cable) to communication interface 324. Computer readable storage media refers to any non-transitory, non-volatile tangible storage medium that provides recorded instructions and/or data to the computing device 300 for execution and/or processing. Examples of such storage media include magnetic tape, CD-ROM, DVD, Blu-ray™ Disc, a hard disk drive, a ROM or integrated circuit, a solid state storage drive (such as a USB flash drive, a flash memory device, a solid state drive or a memory card), a hybrid drive, a magneto-optical disk, or a computer readable card such as a SD card and the like, whether or not such devices are internal or external of the computing device 300. Examples of transitory or non-tangible computer readable transmission media that may also participate in the provision of software, application programs, instructions and/or data to the computing device 300 include radio or infra-red transmission channels as well as a network connection to another computer or networked device, and the Internet or Intranets including e-mail transmissions and information recorded on Websites and the like.

[0068] The computer programs (also called computer program code) are stored in main memory 308 and/or secondary memory 310. Computer programs can also be received via the communication interface 324. Such computer programs, when executed, enable the computing device 300 to perform one or more features of embodiments discussed herein. In various embodiments, the computer programs, when executed, enable the processor 304 to perform

features of the above-described embodiments. Accordingly, such computer programs represent controllers of the computer system 300.

[0069] Software may be stored in a computer program product and loaded into the computing device 400 using the removable storage drive 314, the storage drive 312, or the interface 340. Alternatively, the computer program product may be downloaded to the computer system 300 over the communications path 326. The software, when executed by the processor 304, causes the computing device 300 to perform functions of embodiments described herein.

[0070] It is to be understood that the embodiment of Figure 3 is presented merely by way of example. Therefore, in some embodiments one or more features of the computing device 300 may be omitted. Also, in some embodiments, one or more features of the computing device 300 may be combined together. Additionally, in some embodiments, one or more features of the computing device 300 may be split into one or more component parts.

[0071] In an implementation, the payment network server 108 may be generally described as a physical device comprising at least one processor 402 and at least one memory 404 including computer program code. The at least one memory 404 and the computer program code are configured to, with the at least one processor 402, cause the physical device to perform the operations described in Figure 2. In an implementation, the payment network server 108 may also be configured to perform the operations of the wallet-based network server 114 described in Figure 1. An example of the payment network server 108 is shown in Figure 4.

[0072] For example, the method of Figure 2 may be implemented as software and stored in a non-transitory fashion in the secondary memory 310 or the removable storage units 318, 322 of the computer device 300.

[0073] It will be appreciated by a person skilled in the art that numerous variations and/or modifications may be made to the present invention as shown in the specific embodiments

without departing from the spirit or scope of the invention as broadly described. For example, the above description mainly discusses the use of a Bluetooth connection, but it will be appreciated that another type of secure wireless connection, such as Wi-Fi, can be used in alternate embodiments to implement the method. Some modifications, e.g. adding an access point, changing the log-in routine, etc. may be considered and incorporated. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

CLAIMS

1. An apparatus for conducting a user-approved transaction using one of a plurality of accounts linked to an account identifier, the apparatus comprising:

at least one processor; and

at least one memory including computer program code;

the at least one memory and the computer program code configured to, with at least one processor, cause the apparatus at least to:

retrieve historical transaction data, the historical transaction data relating to a plurality of historical transactions conducted using at least one of the plurality of accounts;

analyze the retrieved historical transaction data to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period;

determine one of the plurality of accounts to be used to be used for conducting the transaction, the determined account having an amount equal to or more than the predicted future transaction amount;

conduct the user-approved transaction within the predetermined time period using the determined account;

determine a plurality of weights; and

assign each of the plurality of weights to the retrieved historical transaction data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period.

2. The apparatus according to claim 1, wherein the at least one memory and the computer program code is further configured with the at least one processor to:

retrieve the historical transaction data periodically.

3. The apparatus according to claim 1 or 2, wherein the at least one memory and the computer program code is further configured with the at least one processor to:

identify an account characteristic based on the accounts; and

determine the account identifier based on the account characteristic.

4. The apparatus according to any one of claims 1-3, wherein the at least one memory and the computer program code is further configured with the at least one processor to:

retrieve fixed transaction data relating to fixed transactions that are completed on a periodic basis.

5. The apparatus according to any one of claims 1-4, wherein the at least one memory and the computer program code is further configured with the at least one processor to:

update a transaction database to include additional transaction data when an additional transaction is made using one of the plurality of accounts;

retrieve the additional transaction data; and

analyze the additional transaction data.

6. The apparatus according to any one of claims 1-5, wherein the at least one memory and the computer program code is further configured with the at least one processor to:

transfer funds from the other payment accounts to the determined account so that funds in the determined account is more than or equal to an amount predicted to be made from the determined account.

7. The apparatus according to any one of claims 1-6, wherein the at least one memory and the computer program code is further configured with the at least one processor to:

apply a mathematical model to the historical transaction data.

8. The apparatus according to claim 7, wherein the mathematical model comprises fuzzy logic and/or a regression model.

9. A computer-implemented method for conducting a user-approved transaction using one of a plurality of accounts linked to an account identifier, the method comprising:

retrieving historical transaction data, the historical transaction data relating to a plurality of historical transactions conducted using at least one of the plurality of accounts;

analyzing the retrieved historical transaction data to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period;

determining one of the plurality of accounts to use for conducting the user-approved transaction, the determined account having an amount equal to or more than the predicted future transaction amount;

conducting the user-approved transaction within the predetermined time period using the determined account; and

determining a plurality of weights;

wherein the step of analysing the retrieved historical transaction data includes assigning each of the plurality of weights to the retrieved historical transaction data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period.

10. The method according to claim 9, wherein the step of retrieving the historical transaction data is done periodically.

11. The method according to claim 9 or 10, further comprising:

identifying an account characteristic based on the accounts; and

determining the account identifier based on the account characteristic.

12. The method according to any one of claims 9-11, wherein the step of retrieving historical transaction data comprises retrieving fixed transaction data relating to fixed transactions that are completed on a periodic basis.

13. The method according to any one of claims 9-12, further comprising

updating a transaction database to include additional transaction data when an additional transaction is made using one of the plurality of accounts, wherein retrieving historical transaction data includes retrieving the additional transaction data and wherein analyzing the retrieved transaction data includes analyzing the additional transaction data.

14. The method according to any one of claims 9-13, further comprising transferring funds from the other payment accounts to the determined account so that funds in the determined account is more than or equal to an amount predicted to be made from the determined account.

15. The method according to any one of claims 9-14, wherein analyzing the historical transaction data comprises applying a mathematical model to the historical transaction data.

16. The method according to claim 15, wherein the mathematical model comprises fuzzy logic and/or a regression model.

17. The method according to claim 16, further comprising

determining a plurality of weights;

wherein the step of analysing the retrieved historical transaction data includes assigning each of the plurality of weights to the retrieved historical transaction data so as to predict a future transaction amount to be made by at least one of the plurality of accounts within a predetermined time period.

18. A computer-readable storage medium having stored thereon computer program code which when executed by a computer causes the computer to execute a method in accordance with any one of claims 9 to 17.