BEHAVIOR PATTERN ANALYSIS

TECHNICAL FIELD

[001] The present disclosure relates generally to technologies for loan dispersion and more specifically to a method for determining a financial credibility and assessing risk for an individual to facilitate payday loan.

BACKGROUND

[002] Smartphone or the handheld devices have changed the conventional way of carrying out routine task and the interaction during the task. One of the most important aspect of daily routine the devices have changed and altered is the method of carrying financial transactions.

[003] The financial transactions include banking systems, loans systems and the payment systems. The loan systems however need more alteration in order to meet and adapt to the new ways of transactions. More importantly the short term loans or the pay day loans.

SUMMARY

[004] In one implementation of the present disclosure a verification request along with a profile creation request may be received at a remote central server from at least one remote handheld device. Further a verification code may be sent to the at least one remote handled device over a first communication gateway. Further retrieving a plurality of first information from a social network associated with profile. The method may comprise retrieving a plurality of information from the at least one remote handheld device over a communication gateway. Further extracting a plurality set of information from the plurality of information. The method may further comprise automatically mapping the plurality set of information with a plurality of sets. Further assigning a weightage to the plurality of sets.

[005] In another implementation a system for generating financial weightage and loan dispersion is disclosed. The system may comprise at least one remote handheld device having an application embedded into the at least one remote handheld device enabling financial transactions. The system may further comprise a central server placed remotely and communicably connected to the at least one remote handheld device over a communication gateway. Further the

system may comprise a first financial module communicably connected to the central server through the communication gateway. Further a second financial module communicably connected to the at least one remote handheld device and the central server. The second financial module is associated with a profile of the at least one remote handheld device. The system may comprise a first communication gateway configured to verify the at least one remote handheld device, and communicably connected to the central server.

BRIEF DESCRIPTION OF THE DRAWINGS

[006] The detailed description is described with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the drawings to refer like features and components.

[007] Figure 1, illustrates a flow chart depicting the method of determining a social loan quotient (SLQ) of customers in accordance with the present disclosure.

[008] Figure 2, illustrates a flow chart depicting a method enabling and facilitating a pay day loan according to an exemplary embodiment.

[009] Figure 3, illustrates a flow chart of the present disclosure according to an exemplary embodiment.

[0010] Figure 4, illustrates an exemplary system in accordance with the present disclosure.

DETAILED DESCRIPTION

[0011] In an exemplary embodiment, according to the present disclosure a system and method for determining a financial credibility of a person for facilitating a payday loan are disclosed. In the present disclosure, a social loan quotient (SLQ), a financial credibility score, is a single in-house score that encompasses and reports the credit worthiness of a customer, using completely alternate data compared to the traditional bureau scores. Based on mapping social behaviour to credit behaviour, the present invention also gives a bird's eye view of entirety the customer's credit history.

[0012] The present disclosure enables an user or customer to create profile using a handheld device (like a smartphone), and his/her social network (like Facebook or LinkedIn) for applying and checking eligibility for a payday loan. The present disclosure further enables the determination of social loan quotient (SLQ) for a plurality of users. Each user, called as 'customer', may have the remote handheld device with an application embedded on the handheld device for enabling financial transactions. Further each user may submit the request for creation of the profile to a server. The server may be a central server located remotely, or a cloud server located remotely. The server in its first step may verify the creation and authenticity of profile by sending a unique identifying link or number over a SMS gateway or via internet. According to the present disclosure upon verification of the profile the user may allowed to upload requisite documents and information and along with permission to access his/her social network. The documents may comprise of Pay Slip, Address Proof. Further information may be captured from the user like mobile number, duration of the use of the same mobile number, details on the current employment, details on the present housing, details of spouse, educational qualification, landline number, and/or official email. Further upon receiving the information and documents, by the central server, the required information may be captured automatically. The information may further be mapped with fields of a database and the appropriate cells may be populated with the associated information. Further the documents and the information may be verified by a third source.

[0013] Further the social network of the user and other parameters of the user from the handheld device may be reviewed and a social loan quotient may be assigned to each user, wherein the social quotient may be used in assessing the user's risk factor as a loan applicant. Based on the social quotient and the cumulative weightage, i.e. summation of weightage of each cell and risk assessment, the server may render and populate the display of the handheld device of the user with a notification as to whether they are eligible for a payday loan and the amount they are eligible for.

[0014] According to the present disclosure the server may further provide a bridge for financial transactions between the user and a pre-determined financer. The financer may be bank or peers.

[0015] In an embodiment of the present disclosure, data from a plurality of channels are used for determining the social loan quotient (SLQ) of at least one customer. The plurality of channels comprise the customer's handheld device, social networking profile and media of the customer, a geographic information of the customer (using GPS module of the handheld device) and the information of the customer provided on the database. The customers are grouped into one or more communities based on data gathered from the plurality of channels using machine learning techniques. Each community exhibits almost similar behaviour among its individual members, and each customer is assigned his/her own individual creditability score (SLQ) based on a cost function. The cost function is a function of the general behaviour of the community as well as the behaviour of the particular customer on previous loans. It has been observed that over a period of time, customers with the behaviour similar across the plurality of channels, also exhibit similar behaviour to credit.

[0016] In an embodiment of the present disclosure, a plurality of parameters of customers are collected from the plurality of channels for calculating the social loan quotient (SLQ) for customers. The plurality of parameters of customers comprise (a) the information populated in the cells of the database for each profile, (b) data from the handheld device collected through the image of the customer, (c) information from social media logins of the customer (like Facebook/Google/Linkedin), (d) geographic information of the customer, (e) bank statement parameters and (f) Loan history based attributes.

[0017] Further according to the present exemplary embodiment, the information populated in the cells of the database for each profile, comprise parameters, as shown in the sample table A below.

Serial No	Credit Risk Parameter	Value Range
1.	Age	

2.	Educational Qualification	Qualification - Undergraduate/ Graduate/ Post Graduate
3.	Residence Type	Rented/Own House/ Paying Guest
4.	Address	City and Area with Pincode, (Permanent/Current)
5.	Monthly Customer Income	
6.	Company of employment	Name of the Company
7.	Address of the company	City and Area with Pincode,
8.	Designation	
9.	Employed at current company since	1 Months – 6+ years
10.	Cell Number & Using for how long	
11.	Years in current house	1 Months – 6+ years
12.	Landline	
13.	Email address Official	

Table A

[0018] According to the present disclosure, data from the handheld device of the customer comprise parameters, as shown in the sample table B below.

Serial No.	Credit Risk Parameter	Range
1.	Login type	GooglePlus/Facebook/LinkedIn
2.	Referrer details/ Referral details	Name and address of the referrer
3.	Number of Social Connections	
4.	Number of Contacts	
5.	Number of Logins	
6.	Application data-	count and list of applications
7.	Application install/uninstall parameters	

8.	Latitude/ Longitude	

Table B

[0019] Further according to the present disclosure, bank statement parameters and Loan history based attributes, comprise parameters, as shown in the sample table C below.

Serial No.	Credit Risk Parameter	Range
Bank Statement Parameters		
1.	Spending/Lifestyle Patterns	
2.	Salary Credits	
3.	Account Balances	
Loan Related Parameters		
	Number of loans	
	Loan Amount	
	Number of Defaulted/ Paid on Time loans	
	Defaulted/ On Time loan amount	

Table C

[0020] According to the exemplary embodiment of the present disclosure, a method of determining a social loan quotient (SLQ) for a plurality of customers for facilitating a payday loan is disclosed. The social loan quotient (SLQ) of each customer is calculated by a central server, where the central server may comprise one or more processing units and a memory unit. In another implementation the present disclosure, social loan quotient (SLQ) of the customer may be calculated by the handheld device of the customer. The method of determining the social loan quotient (SLQ) of the customer is performed in various steps. Customer data from the plurality of channels is retrieved at the central server. An image of the customer from his/her handheld device, basic social media profile of the customer

and geographic indicators, along with his loan application creates a data bank for the system to calculate the SLQ. Referring to figure 1, illustrated is a flow chart depicting the method of determining a social loan quotient (SLQ) of a customer in accordance with the present disclosure.

[0021] The central server may use a machine learning process and generates a distance array for every pair of customers in the system during the training process of the SLQ calculation process. The distance array has a distance between every pair of customers in the system. While the distance array is created, each customer is represented as a point on an N-Dimensional attribute space, where N corresponds to the total number of attributes that are being considered for the score calculation. These attribute values are normalised, or converted into a value between 0-1.

[0022] The retrieved customer data from various channels is divided into categorical variables (such as House Type or Address Type) and continuous or numerical variables (such as age, salary). Similarity and dissimilarity between each set of variables is measured using distance between the set of variables. In continuous variables, a straight line distance between the continuous variables is measured as the Euclidean distance between the various values as data points, while in categorical variables, distance between the categorical variables is measured as a function of the mode of the variables. In one embodiment, Hamming Distance is used to calculate the distance between the categorical variables. Hamming distance measures the minimum number of substitutions required to change one string into the other, or the minimum number of errors that could have transformed one string into the other. The two dissimilarity scores so calculated for continuous variables and categorical variables are combined to obtain a distance matrix for each customer.

[0023] Further for each customer, a cluster is formed by taking the nearest N (one or more) customers with similar loan history, to the focal customer, from the data bank. These N customers are obtained from a sorted distance array. Hence for every customer, a cluster/community of N closest customers are obtained and all the customers within a cluster have a similar credit behavior.

Thus, each customer is placed among one of a fixed number of distinct clusters, each cluster represents the customers with similar credit behaviour.

[0024] After forming clusters for each customer, a cluster center is formed by taking central tendencies of the numerical variables through mean and categorical variables through mode so that values of the central tendency for the cluster center is obtained. In other words, the cluster center is the average of all points in each cluster. Further, distances between each customer in the cluster and the cluster center are calculated, by the same approach of using a combination of Euclidean distances and hamming distances.

[0025] It is important to measure a confidence measure on the predictive abilities of individuals with prior loan history as the creditworthiness measure of any new customer depends on the similarity of him/her to other individuals in that particular community/cluster. Such measure of the confidence is called as Predictor Confidence, and the measurement of predictor confidence is done by taking a cross-validation approach of using previous customers behaviours to arrive at predictions for other known customers. This predictive accuracy is used to create a predictor confidence score (PCS) for each customer. A data subset is created for the customers only with loan history and then the score predictions for each of the customer is measured by using other customers with loan history.

[0026] Furthermore, a composite score for each customer at the cluster center is generated using their current and previous loan history (past borrowing behavior). Every customer with loan history, has a record of loans that have been paid on time, delayed or reneged on. This information is then used to create the composite score for each customer with loan history. The composite score is an indicative of past credit behaviour of the customer. The distance of each customer from the cluster center is calculated and used as a scaling factor for the composite score of the customer. The generated composite scores are then spread using a sigmoid function and normalised across all customers to a value between 0-1000, and the normalised value is the final alternative credit score of the customer.

[0027] The composite score is calculated using the following function:

$$f(x)=\sum_{i=0}^{n} 1/e^{(1/n)}(norm\ amount+loan\ fraction)$$

[0028] Here 'norm amount' indicates the normalised installment/loan amount and loan fraction indicates what fraction of the loan is this particular installment. Hence the function f(x) is a summation of all installments over all loans taken by the customer, and the importance of the function decreases exponentially as the number of the loans increases, that is, a customer's activity on his/her first loan is much more important than their activity on the tenth loan.

[0029] The composite score is calculated for all loans that have been paid on time (OT), delayed(D) or reneged(R). The composite score (CS) then becomes:

$$CS = OT + 0.5*D - R$$

the composite score of the focal customer is calculated, once the composite score for all other customers is calculated. For calculating the composite score for the focal customer, the composite score of the cluster center is calculated first by scaling the composite scores of all customers with respect to their distance from the center, and the confidence score of each customer as obtained above, and then summing up all the scaled composite scores.

[0030] If the composite score of the of the focal customer is CS, then the SLQ score for that particular customer is calculated as:

SLQ = (0.6*CS + 0.4*(1-distance to center)*(composite score of center)).

Thus, the SLQ is a balanced score of the general community behaviour as well as the score basis the personal history of an individual. The calculated SLQ is again normalised to achieve a single score that is put through the sigmoid function.

[0031] Due to the highly rapid nature of the financial business, there is significant change in the overall profile of the customer base every 24 hours, in terms of the loans paid on time, delayed or reneged on. Hence the SLQ score is also dynamic, and changes every time. There is some event associated with a customer or with any of the customers in his/her community.

[0032] Figure 2, illustrates a flow chart of the present disclosure according to an exemplary embodiment of the present disclosure. The flow chart illustrates a method enabling and facilitating a pay day loan. At the Step 102 a remote central

server may receive a profile creation and a verification request from at least one user. The request may be received over a communication gateway. The communication gateway may be a wired or wireless communication network that includes, but not limited to a cellular communication network, Wi-Fi, WiMAX, or any other suitable technologies.

[0033] Further at Step 104, the remote central server may send a verification code to the at least one handheld device over a first communication gateway. The verification code may be unique alphanumeric code or a verification link. Further the first communication gateway may be SMS gateway, or internet gateway. The at least one remote handled device may be configured to read the verification code automatically upon receipt. Further at step 106 the remote central server may retrieve a plurality of first information. The plurality of first information may pertain to social network of the user requesting creation of profile and loan. Further at step 108 the server/remote central server may retrieve a plurality of information. The plurality of information may be provided by the user during the profile creation. The plurality of information may be provided in a document format or written replies to a set of survey questions or both by the user.

[0034] Further in another aspect of the exemplary embodiment the plurality of information may be additionally verified by a third party source. At step 110 a plurality of set of information may be extracted from the plurality of information. Further at step 112 the extracted plurality of set of information may be mapped to a plurality of sets. The plurality of set of information may pertain to but not limited to pay slip, address proof and details, cell phone number and duration of use, employment details, hosing details, information of spouse, educational qualification, landline, and or official email id.

[0035] Further the plurality of sets may comprise monthly customer income, employment details (name of company, designation, employer), permanent account number/income tax filing number, date of birth, address, cell number & duration of use, housing (PG, rented or owned), Spouse monthly income.

[0036] Further at step 114, the central server may be configured to assign a weightage to the plurality of sets. The weightage may be assigned intuitively by the system based on the instruction or manually assigned. Further the central server may use a machine learning process that may be based on historical data to intuitively assign weightage, risk factor and loan amount.

[0037] According to the present exemplary embodiment, the central server may further be configured to dynamically configure, i.e. assign, modify or edit a pre-defined set of parameters. The pre-defined parameters may be attributed to risk associated with the profile creates. The risk associated may relate to the financial risk, i.e. loan defaulting by the user. The pre-defined set of parameters may comprise of but not limited to income risk, cell usage, employment duration, dwelling duration, or email extensions. Further these pre-defined parameters may configured intuitively or manual by human intervention and numerical value may be assigned to each parameters and a sum can be calculated.

[0038] In one aspect of the present disclosure a second value may be assigned by the central server, wherein the second value may pertain to an amount of loan available for the user. In another aspect, a first value may be extracted from the plurality of set. For, e.g. this value may pertain to amount of loan requested by the user. Further, the first value and a second value may be compared. The second value may be computed based on the weightage and the numerical value assigned to the predefined parameters. According to the exemplary embodiment the second value should be same or smaller to the first value. For e.g. the second value may correspond to amount of loan approved by the system. The second value may then be communicated to the user on his remote handheld device, in form of notification rendered on the display of the at least one remote handheld device. The method according to the exemplary embodiment may enable a first finance module to send and receive request from a second finance module associated with the profile over the communication gateway.

[0039] Figure 3, illustrates a flow chart of the present disclosure according to an exemplary embodiment. At the Step 202 a remote central server may receive

a profile creation and a verification request from at least one user. The request may be received over a communication gateway. Further at Step 204, the remote central server may send a verification code to the at least one handheld device over a first communication gateway. The verification code may be unique alphanumeric code or a verification link. Further the first communication gateway may be SMS gateway, or internet gateway. The at least one remote handled device may be configured to read the verification code automatically upon receipt. Further at step 206 the remote central server may retrieve a plurality of information. The plurality of information may pertain to social network of the user requesting creation of profile and loan request, documents, or other requisite information pertaining to the user. At step 208, extracting a first set of information from the plurality of information and automatically mapping the first set of information to a first set. For e.g. first set of information may pertain to pay slip details of the user and the first set may contain monthly customer income, name of company, PAN details, date of birth, the designation of the user, and the employer.

[0040] At step 210, extracting a second set of information from the plurality of information and automatically mapping the second set of information to a second set. For e.g. second set of information may pertain to utility bill, postpaid telephone bill, passport, i.e address. At step 212, extracting a third set of information from the plurality of information and automatically mapping the third set of information to a third set. For e.g. third set of information may pertain to cell phone number associated and verified by the user, and the duration of using the cellphone number. At step 214, extracting a fourth set of information from the plurality of information and automatically mapping the fourth set of information to a fourth set. For e.g. fourth set of information may pertain duration at the present employee. At step 216, extracting a fifth set of information from the plurality of information and automatically mapping the fifth set of information to a fifth set. For e.g. fifth set of information may pertain to type of housing of the user i.e. owned, rented or a paying guest. At step 218, extracting a sixth set of information from the plurality of information and automatically mapping the sixth

set of information to a sixth set. For e.g. sixth set of information may pertain to details about spouse.

[0041] At step 220, extracting a seventh set of information from the plurality of information and automatically mapping the seventh set of information to a seventh set. For e.g. seventh set of information may pertain to duration at the present housing arrangement. At step 222, extracting an eighth set of information from the plurality of information and automatically mapping the eighth set of information to an eighth set. For e.g. eighth set of information may pertain to educational qualification of the user or loan applier. At step 224, extracting a ninth set of information from the plurality of information and automatically mapping the ninth set of information to a ninth set. For e.g. ninth set of information may pertain to landline details. Further at step 226, extracting a tenth set of information from the plurality of information and automatically mapping the tenth set of information to a tenth set. For e.g. tenth set of information may pertain to registered or official email id.

[0042] Figure 4, illustrates an exemplary system in accordance with the present disclosure. The system 300 of the present disclosure may comprise of at least one remote handheld device **302**. The at least one remote handheld device may have an application embedded, enabling financial transactions. The remote handheld device may comprise one or more processing units and an internal memory unit. Further the system may comprise a central server **304** placed remotely and communicably connected to the at least one remote handheld device over a communication gateway **306**. A first financial module **308** may communicably be connected to the central server through the communication gateway **306**. Further a second financial module **310** may communicably be connected to the at least one remote handheld device **302** and the central server **304**. Further the second financial module **310** may be associated with a profile of the at least one remote handheld device **302**. The system 300 may comprise a first communication gateway configured **312** to verify the at least one remote handheld device, and communicably connected to the central server **304**.

[0043] The system **300** may further comprise a credit check module **314**. The credit check module **314** may be embedded in the central server. Further the credit check module **314** may comprise a weightage module **316** configured to assign a weight to a plurality of sets. The system 300 may further be configured to verify a plurality of information retrieved from the at least one handheld device. The credit check module **314** may further be configured to determine a second value based on the assigned weightage and a numerical value assigned to a predefined parameters. The system 300 may further comprise a bank module **318**. The bank module may enable financial transaction between the first financial module and the second financial module.

[0044] In the present disclosure, the entire calculation of social loan quotient (SLQ) is performed based solely on alternative data. The alternative data is collected and measured in a same way for different privileged customers and other groups of customers. Further, the present disclosure provides a way to cohesively score all customers on a single platform, many with less than optimal bureau credit scores. In the case of new to credit (NTC) customers, no credit scores are calculated while accurately charting the customer's credit history across every single loan she/he applied for. Thus, the present disclosure enables lending that offers a great deal of flexibility for low value short-term loans, with a very degree of prediction accuracy.

[0045] Although the present disclosure has been described in the context of certain aspects and embodiments, it will be understood by those skilled in the art that the present disclosure extends beyond the specific embodiments to alternative embodiments and/or uses of the disclosure and obvious implementations and equivalents thereof. Thus, it is intended that the scope of the present disclosure described herein should not be limited by the disclosed aspects and embodiments above.

WE CLAIM:

1. A method of determining a social loan quotient (SLQ) of a plurality of customers, by a central server comprising one or more processing units and a memory unit, the method comprises the steps of:

   collecting an information of a customer from a plurality of channels, wherein the customer has a handheld device with an application;

   generating a distance array for every pair of customers, wherein the distance array has a distance between every pair of customers;

   representing each customer as a point on an attribute space;

   dividing the collected information of the customer from the plurality of channels into a multiple set of variables and calculating a dissimilarity score for each set of variables;

   combining the dissimilarity score for each set of variables to obtain a distance matrix for each customer;

   calculating a predictor confidence score (PCS) for every known customer;

   creating at least one cluster of closest customers for every focal customer;

   determining a cluster center and calculating a value of distance of each customer from the cluster center;

   generating a composite score of each customer in the cluster using past borrowing behaviour of the customer; and

   calculating the social loan quotient (SLQ) of each customer using past behaviour of focal customer and the distance of each customer from the cluster center.

2. The method as claimed in claim 1, wherein the method further comprises scaling the social loan quotient (SLQ) obtained via sigmoid function to calculate a final SLQ score.
3. The method as claimed in claim 1, wherein the information of the customer comprises a plurality of parameters of customers.

4. The method as claimed in claim 3, wherein a plurality of parameters of customers comprise at least one of an information from a database of the application for each customer profile, or data collected from the handheld device, or social media profile of the customer, or geographic information of the customer, or bank statement parameters, or Loan history based attributes.
5. The method as claimed in claim 4, wherein the information from the database of the application for each customer profile comprises age, educational qualification, residence type, address, monthly income, company of employment, address of the company and his designation.
6. The method as claimed in claim 4, wherein data collected from the handheld device comprises login type, application data, number of logins, application install/uninstall parameters.
7. The method as claimed in claim 4, wherein social media profile of the customer comprises number of social connections and number of contacts.
8. The method as claimed in claim 4, wherein bank statement parameters comprise spending and lifestyle patterns of the customer, salary credits and account balances.
9. The method as claimed in claim 4, wherein loan history based attributes comprise number of loans, loan amount, number of defaulted loans, number of paid on time loans and defaulted or on time loan amount.
10. The method as claimed in claim 1, wherein multiple set of variables comprise categorical variables and continuous or numerical variables.
11. The method as claimed in claim 1 and claim 10, wherein the dissimilarity score for continuous variables is calculated as Euclidean distance between the set of variables.
12. The method as claimed in claim 1 and claim 10, wherein the dissimilarity score for categorical variables is calculated as Hamming distance between the set of variables.
13. The method as claimed in claim 1, wherein the predictor confidence score (PCS) for every known customer is calculated by taking a cross-validation

approach of using behaviour of previous customers to determine predictions for other known customers.

14. The method as claimed in claim 1, wherein the at least one cluster of each customer is formed by taking the nearest customers with similar loan history, to the focal customer.
15. The method as claimed in claim 1, wherein the cluster center is the average of all points in each cluster.
16. The method as claimed in claim 1, wherein the composite score for each customer at the cluster center is generated using the current and previous loan history of the customer.

17. A system comprising:

at least one remote handheld device **302** having an application embedded into the at least one remote handheld device **302**, enabling financial transactions;

a central server **304** placed remotely and communicably connected to the at least one remote handheld device over a communication gateway **306**;

a first financial module **308** communicably connected to the central server through the communication gateway **306**;

a second financial module **310** communicably connected to the at least one remote handheld device **302** and the central server **304**, wherein the second financial module **310** is associated with a profile of the at least one remote handheld device **302**; and

a first communication gateway configured **312** to verify the at least one remote handheld device, and communicably connected to the central server **304;**

wherein the central server **304** comprises one or more processing units and a memory unit, the central server calculates a social loan quotient (SLQ) for a plurality of customers using an information of each customer from a plurality of channels and the current and previous loan history of the customer.

18. The system of claim 17, further comprises a credit check module **314**, wherein the credit check module **314** is embedded in the central server.
19. The system of claim 18, wherein the credit check module **314** further comprises weightage module **316** configured to assign a weight to a plurality of sets.
20. The system of claim 18, wherein the credit check module **314** is further configured to verify a plurality of information retrieved from the at least one handheld device.
21. The system of claim 18, wherein the credit check module **314** is further configured to determine a second value based on the assigned weightage and a numerical value assigned to a predefined parameters.
22. The system of claim 21, wherein the numerical value is assigned to the predefined parameters is computed using a machine learning algorithm.
23. The system of claim 17, further comprises a bank module **318**, wherein the bank module enables financial transaction between the first financial module and the second financial module.