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CREDIT CARD WITH DYNAMIC CREDIT RATING DISPLAY

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CREDIT CARD WITH DYNAMIC CREDIT RATING DISPLAY

VISA

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TECHNICAL FIELD

[0001] The present subject matter relates to payment technology and, more particularly to, a method, system and payment card for dynamically displaying credit rating.

BACKGROUND

[0002] Payment cards have become an indispensable part of our lives and consumers increasingly rely on payment cards for performing transactions at terminals such as, Point-of-Sale (POS) terminals at merchant facilities, and Automated Teller Machine (ATM) terminals. More specifically, credit cards with its ease of use, convenient pay-back options and opportunity to earn rewards has become a primary way consumers pay for purchases today. The biggest advantage of a credit card is easy access to credit. In general, credit cards offer a chance to build up a line of credit. Banks and financial institutions often look to credit card usage (credit history, repayments, card usage, etc.) as a way to gauge a potential loan applicant's creditworthiness, thereby making the credit card an important tool for lending institutions to view credit information for future loans or rental applications. In one example, lending institutions may reject a loan application or provide a loan at a higher interest rate or even offer a loan at the best interest rate available in the market based on a credit rating.

[0003] Accordingly, the credit rating is an important factor that is considered by lenders at the time of offering a loan/credit. It is a numerical summary of credit history and repayment behaviour. More specifically, the credit rating will depend on debts/loans availed, manner in which the debts/loans are paid, type of credit accounts maintained by the consumer, age of the accounts, any delinquency related to the credit card, and the like. In general, a third party provides this service of determining the credit rating for each cardholder. In such cases, the cardholder may have to visit the issuing bank to collect the credit history and credit rating which is cumbersome and time consuming. Further, if the credit is for a small retail loan, such as, Business-to-Business (B2B) service or Business-to-Consumer (B2C) service, there is no mechanism for the cardholder to easily avail retail loans without showing the credit rating.

[0004] In view of the above discussion, there exists a need for a cardholder to be aware of the credit rating associated with the payment card.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and, together with the description, serve to explain the disclosed principles. 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 figures to reference like features and components. Some embodiments of device or system and/or methods in accordance with embodiments of the present subject matter are now described, by way of example only, and with reference to the accompanying figures, in which:

[0006] FIG. 1 illustrates an example representation of an environment for implementing embodiments consistent with the present disclosure.

[0007] FIG. 2 illustrates a system for dynamically determining credit rating.

[0008] FIG. 3A illustrates a simplified block diagram of the payment card for dynamically displaying credit rating associated with the payment card.

[0009] FIG. 3B illustrates a payment card for dynamically displaying credit rating associated with the payment card.

[0010] FIG. 4 illustrates an example representation of a User Interface (UI) displayed to a cardholder on a display screen of a user device indicating credit rating of the payment card associated with the cardholder.

[0011] FIG. 5 depicts a flowchart illustrating a process for manufacturing a 3D adversarial face target.

[0012] The figures depict embodiments of the disclosure for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles of the disclosure described herein.

DESCRIPTION OF THE DISCLOSURE

[0013] In the present document, the word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any embodiment or implementation of the present subject matter described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other embodiments.

[0014] While the disclosure is susceptible to various modifications and alternative forms, specific embodiment thereof has been shown by way of example in the drawings and will be described in detail below. It should be understood, however that it is not intended to limit the disclosure to the particular forms disclosed, but on the contrary, the disclosure is to cover all modifications, equivalents, and alternative falling within the spirit and the scope of the disclosure.

[0015] The terms "comprises", "comprising", or any other variations thereof, are intended to cover a non-exclusive inclusion, such that a setup, device or method that comprises a list of components or steps does not include only those components or steps but may include other components or steps not expressly listed or inherent to such setup or device or method. In other words, one or more elements in a device or system or apparatus preceded by "comprises... a" does not, without more constraints, preclude the existence of other elements or additional elements in the device or system or apparatus.

[0016] The terms "an embodiment", "embodiment", "embodiments", "the embodiment", "the embodiments", "one or more embodiments", "some embodiments", and "one embodiment" mean "one or more (but not all) embodiments of the invention(s)" unless expressly specified otherwise.

[0017] The terms "including", "comprising", "having" and variations thereof mean "including but not limited to", unless expressly specified otherwise.

[0018] The term "payment account" used herein refers to a financial account that is used to fund a financial transaction (interchangeably referred to as "payment transaction"). Examples of the payment account include, but are not limited to a savings account, a credit account, a checking account, digital wallet, and a virtual payment account. The payment account may be associated with an entity such as an individual person, a family, a commercial entity, a company, a corporation, a governmental entity, a non-profit organization, and the like. In some

scenarios, the payment account may be a virtual or temporary payment account that can be mapped or linked to a primary payment account, such as those accounts managed by PayPal®, and the like.

[0019] The term ‘payment card’ as used herein, refers to a physical card linked with a financial or payment account that may be presented to a merchant or any such facility in order to fund a financial transaction via the associated payment account. Additionally, or alternatively, the payment card may be used for performing a transaction at a terminal (e.g., ATM). Examples of the payment card include, but are not limited to, debit cards, credit cards, prepaid cards, gift cards, forex cards, charge cards and stored-value cards.

[0020] The term ‘credit rating’ as used herein refers to a qualitative and quantified assessment of a prospective entity’s ability to fulfil financial obligations in completeness and within the established due dates. More specifically, credit rating is a representative value predicting the likelihood of the prospective debtor defaulting his/her financial obligation. In other words, the credit rating indicates a credit risk associated with a debtor. The credit rating may be determined based on one or more attributes associated with the prospective debtor (hereinafter interchangeably referred to herein as ‘cardholder’ or simply as ‘consumer’). The one or more attributes may include information obtained from the cardholder (for example, payment card related data) and information collated from external sources relating to spending behaviour of the cardholder (for example, transaction history on e-commerce sites, purchase history of consumables, etc.). Dynamically determining and displaying the credit rating will be explained in detail with reference to **FIGS. 1-5**.

[0021] **FIG. 1** illustrates an exemplary representation of an environment 100, in which at least some example embodiments of the present disclosure can be implemented. In an example environment 100, a cardholder 106 visits a merchant facility 102 (also referred to herein as ‘a merchant 102’) for purchasing a product. The cardholder 106 has one or more electronic devices, for example, the cardholder device 108, and one or more payment cards, for example, the payment card 110. The one or more payment cards may be associated with one payment account of an issuer or distributed across different payment accounts of the cardholder 106 associated with multiple issuers. It shall be noted that all these payment accounts may be linked together by a common identifier or information related to the different payment accounts may be collated for performing analysis and/or determining credit rating as will be explained in

detail later. Examples of the cardholder device 108 include, but are not limited to, a Personal Computer (PC), a tablet device, a Personal Digital Assistant (PDA), a smartphone and a laptop.

[0022] The merchant facility 102 is equipped with a POS machine 104 for facilitating payment transactions for goods/services purchased at the merchant facility 102. Examples of the merchant facility 102 may include any retail establishments such as, restaurant, supermarket, exhibition, or business establishments such as, government and/or private agencies, toll gates, parking lot where customers visit for performing financial transaction in exchange for any goods and/or services or any transaction that requires financial transaction between customers and a merchant. In some example embodiments, the POS machine 104 may be a Near Field Communication (NFC) card reader that may be configured to read a payment card information of the payment card 110 from a magnetic stripe or an EMV (Europay, MasterCard® and Visa®) chip housed in the payment card 110. The various entities of the environment 100 may communicate with each other via the network 120. The network 120 may include wired networks, wireless networks, and combinations thereof. Some non-limiting examples of the wired networks may include Ethernet, local area networks (LANs), fiber-optic networks, and the like. Some non-limiting examples of the wireless networks may include cellular networks like GSM/3G/4G/5G/LTE/CDMA networks, wireless LANs, Bluetooth, Wi-Fi or Zigbee networks, and the like.

[0023] In an example scenario, the cardholder 106 may have purchased an electronic good, for example, a Television (hereinafter referred to as 'TV') and as such, may prefer to purchase the TV on credit using the payment card 110. However, the cardholder 106 may not know if he is eligible for purchasing the TV on credit. Moreover, an agent at the merchant facility 102 will have to request for additional data and/or request third party service providers to determine credit rating of the cardholder 106 for determining if the cardholder 106 is eligible for purchasing the TV on credit. In another example scenario, the cardholder 106 may intend to avail a vehicle loan for purchasing a vehicle. As such, the cardholder 106 may not know his eligibility for the vehicle loan or be aware of expected interest rates which are usually determined based on credit rating associated with the cardholder 106.

[0024] Various embodiments of the present invention disclose a system 150 for dynamically determining credit rating. More specifically, the credit rating is determined in real-time based on credit related information and transaction information of the cardholder 106. It shall be

noted that the credit related information and the transaction information may be retrieved from one or more servers (for example, an issuer server 112, an acquirer server 114, and a payment server 116) associated with the payment card 110. The credit related information and the transaction information may be used to predict one or more values corresponding to one or more behavioural parameters of the cardholder 106. The one or more values may be used for determining the credit rating of the cardholder 106. It shall be noted that once the credit rating is above a predefined threshold, the system 150 may also be configured to automatically facilitate the transaction between the issuer server 112 and the acquirer server 114 via the payment server 116. The system 150 for dynamically determining credit rating is explained in detail next with reference to **FIG. 2**.

[0025] **FIG. 2** illustrates the system 150 for dynamically determining credit rating. In an embodiment, the system 150 may be a stand-alone computer system or processor capable of determining the credit rating of the cardholder 106. More specifically, the system 150 is a distributed or centralized server capable of performing one or more of the operations described herein. In another embodiment, the system 150 may be embodied within the POS machine 104 for determining the credit rating of the cardholder 106 when the payment card 110 is swiped/tapped on the POS machine 104. In yet another embodiment, the system 150 may be embodied within the cardholder device 108 for performing the functionalities described herein. In one example, if the cardholder device 108 includes a NFC card reader, the system 150 receives payment card related data of the payment card 110 which is used for determining the credit rating. In another example, if the cardholder 106 is shopping via an e-commerce website, the system 150 embodied within the cardholder device 108 dynamically determine the credit rating in real time for the cardholder 106.

[0026] The system 150 is depicted to include a processor 202, a memory 204, an Input/Output module 206, and a communication interface 208. It shall be noted that, in some embodiments, the system 150 may include more or fewer components than those depicted herein. The various components of the system 150 may be implemented using hardware, software, firmware or any combinations thereof. Further, the various components of the system 150 may be operably coupled with each other. More specifically, various components of the system 150 may be capable of communicating with each other using communication channel media (such as buses, interconnects, etc.). It is also noted that one or more components of the system 150 may be

implemented in a single server or a plurality of servers, which are remotely placed from each other.

[0027] In one embodiment, the processor 202 may be embodied as a multi-core processor, a single core processor, or a combination of one or more multi-core processors and one or more single core processors. For example, the processor 202 may be embodied as one or more of various processing devices, such as a coprocessor, a microprocessor, a controller, a digital signal processor (DSP), a processing circuitry with or without an accompanying DSP, or various other processing devices including, a Micro Controller Unit (MCU), a hardware accelerator, a special-purpose computer chip, or the like. The processor 202 includes a determination unit 210 which is explained in detail later.

[0028] In one embodiment, the memory 204 is capable of storing machine executable instructions, referred to herein as instructions 205. In an embodiment, the processor 202 is embodied as an executor of software instructions. As such, the processor 202 is capable of executing the instructions 205 stored in the memory 204 to perform one or more operations described herein. Further, the memory 204 may store one or more Artificial Intelligence (AI) models, such as, machine learning models, neural networks, for predicting one or more values for one or more behavioural parameters of the cardholder 106. The memory 204 can be any type of storage accessible to the processor 202 to perform respective functionalities, as will be explained in detail with reference to FIGS. 2 to 5. For example, the memory 204 may include one or more volatile or non-volatile memories, or a combination thereof. For example, the memory 204 may be embodied as semiconductor memories, such as flash memory, mask ROM, PROM (programmable ROM), EPROM (erasable PROM), RAM (random access memory), etc. and the like.

[0029] In an embodiment, the processor 202 is configured to execute the instructions 205 for: (1) retrieving credit related information and transaction information from the issuer server 112 or third party service providers, (2) predicting one or more values corresponding to one or more behavioural parameters of the cardholder 106, and (3) determining the credit rating based on the one or more values. In some embodiments, the processor 202 may also facilitate displaying of the credit rating on the cardholder device 108.

[0030] In an embodiment, the I/O module 206 may include mechanisms configured to receive inputs from and provide outputs to peripheral devices such as, an operator of the system 150.

The term ‘operator of the system 150’ as used herein may refer to one or more individuals, whether directly or indirectly, associated with updating prediction policies, thresholds, predefined rules, or one or more parameters for determining the credit rating. To enable reception of inputs and provide outputs to the system 150, the I/O module 206 may include at least one input interface and/or at least one output interface. For example, training data for training the one or more AI models may be provided by the operator of the system 150 using the keyboard/mouse. Examples of the input interface may include, but are not limited to, a keyboard, a mouse, a joystick, a keypad, a touch screen, soft keys, a microphone, and the like. Examples of the output interface may include, but are not limited to, a display such as a light emitting diode display, a thin-film transistor (TFT) display, a liquid crystal display, an active-matrix organic light-emitting diode (AMOLED) display, a microphone, a speaker, a ringer, and the like.

[0031] In an embodiment, the communication interface 208 may include mechanisms configured to communicate with other entities in the environment 100, for example, the cardholder device 108, the POS machine 104, the issuer server 112, the acquirer server 114, and the payment server 116. As such, the communication interface 208 is configured to receive payment card related data, credit related information, and transaction information from various entities. The payment card related data includes information such as, a type of payment card 110 (e.g., credit card, debit card, service provider information), a financial account number of the cardholder 106, name of the cardholder 106 and validity information of the payment card 110. In an embodiment, the credit related information may be

[0032] The system 150 is depicted to be in operative communication with a database 220. In one embodiment, the database 220 is configured to store credit ratings and behavioural parameters of a plurality of cardholders that were determined. These credit ratings may be stored in a table and updated periodically, for example, every time a transaction is performed. Further, the database 220 is configured to store historical credit information and credit ratings of the plurality of cardholders, and statistics and insights related to the credit ratings and the behavioural parameters of the plurality of cardholders.

[0033] The database 220 may include multiple storage units such as hard disks and/or solid-state disks in a redundant array of inexpensive disks (RAID) configuration. In some embodiments, the database 220 may include a storage area network (SAN) and/or a network

attached storage (NAS) system. In one embodiment, the database 220 may correspond to a distributed storage system, wherein individual databases are configured to store custom information, such as prediction rules, weight values for various behavioural parameters, computation metrics, etc.

[0034] In some embodiments, the database 220 is integrated within the system 150. For example, the system 150 may include one or more hard disk drives as the database 220. In other embodiments, the database 220 is external to the system 150 and may be accessed by the system 150 using a storage interface (not shown in **FIG. 2**). The storage interface is any component capable of providing the processor 202 with access to the database 220. The storage interface may include, for example, an Advanced Technology Attachment (ATA) adapter, a Serial ATA (SATA) adapter, a Small Computer System Interface (SCSI) adapter, a RAID controller, a SAN adapter, a network adapter, and/or any component providing the processor 202 with access to the database 220.

[0035] As already explained, the communication interface 208 is configured to receive payment card related data of the payment card 110. In one example, when the cardholder 106 swipes/taps the payment card 110 for a transaction at the POS machine 104, the payment card related data is read by the POS machine 104 and transmitted to the system 150 via the communication interface 208. In another example, when the cardholder 106 provides payment card information in the e-commerce website, the payment card related data is transmitted to the system 150 via the communication interface 208. The communication interface 208 forwards the payment card related data of the payment card 110 to the determination unit 210 of the processor 202.

[0036] The determination unit 210 in conjunction with the instructions 205 stored in the memory 204 is configured to retrieve credit related information and transaction information of the cardholder 106 associated with the payment card 110. More specifically, the determination unit 210 identifies alternate payment accounts and payment cards associated with cardholder 106 based on the payment card related data. In general, information related to the alternate payment accounts and the alternate payment cards may be collated from third party servers (not shown in Figures) hosting information related to a plurality of cardholders or issuer servers associated with different financial institutions. The credit related information includes information related to number of payment accounts associated with the cardholder 106, type of

each payment account, previous loans/credits availed, a total amount availed, an amount of outstanding credit, a credit balance eligible in each payment card, credit payment history, a number of years credit has been availed, recent credits details, types of credits, credit repayment history (i.e., date on which statement was raised and date of repaying amount in part/whole, etc.). It shall be noted that the credit related information disclosed above are for exemplary purposes and the credit related information may include lesser or more information than those described herein. The transaction information of cardholder 106 includes historical transaction information of the cardholder 106. In an example, information related to past 5 transactions performed by the cardholder 106 using the same payment card 110 or other payment cards associated with the cardholder 106 constitute the transaction information. In an embodiment, transaction information may correspond to transactions exceeding a threshold amount. As such, the threshold may be specified by the operator of the system 150.

[0037] The determination unit 210 in conjunction with the instructions stored in the memory 204 is configured to predict one or more behavioral parameters of the cardholder 106 based on the credit related information and the transaction information. Some examples of the one or more behavioral parameters include, but not limited to, payment history, credit usage, age of credit, ability to repay the debt, collateral on hand, default probability, new credits, and the like. In an embodiment, one or more AI models may be used to predict one or more values for the one or more behavioural parameters of the cardholder 106. In an example, machine learning models such as, logistic regression models may be used for predicting the one or more values for the one or more behavioral parameters based on the credit related information and the transaction information. In another example, neural network models such as, Convolutional Neural Networks (CNNs), Long Short Term Memory Networks (LSTMs), Recurrent Neural Networks (RNNs), Generative Adversarial Networks (GANs), Radial Basis Function Networks (RBFNs), Multilayer Perceptrons (MLPs), and the like may be used for predicting the one or more behavioural parameters.

[0038] The determination unit 210 is configured to determine a credit rating for the cardholder 106 based on the one or more values corresponding to the one or more behavioural parameters determined for the cardholder 106. The credit rating is a numerical value that quantifies the risk in providing a credit for the cardholder 106. As such, in a non-limiting example, the one or more values may be averaged to determine the credit rating of the cardholder 106. It shall be noted that techniques known in the art may be used for determining the credit rating based

on the one or more values associated with the one or more behavioural parameters. In an embodiment, different weight values may be assigned to each behavioral parameters to determine the credit rating of the cardholder 106. For example, a weight value assigned for the behavioral parameter of a total amount availed is less when compared with a weight value assigned for the behavioral parameter of credit payment history. The weight values may be updated dynamically and the operator of the system 150 may update/modify the weight values for the one or more behavioural parameters. As the credit related information captures dynamic data, such as, credit repayment history based on repayment dates and statement issued dates, the prediction is a more appropriate value of the risk involved in providing credit for the cardholder 106. The communication interface 208 is configured to transmit the credit rating to at least one of: the payment card 110 or the cardholder device 108. In some embodiments, the credit rating may also be displayed on the POS machine 104 via which the cardholder 106 initiates the transaction. An example of the payment card 110 displaying the credit rating is explained next with reference to **FIGS. 3A-3B**.

[0039] **FIG. 3A** illustrates a simplified block diagram 300 of the payment card 110 for dynamically displaying credit rating associated with the payment card 110. In an embodiment, the payment card 110 is an electronic card which supports display of the credit rating.

[0040] The payment card 110 includes one or more input devices 302, a storage module 304, a power supply 306, a communication module 308 and a display module 314. It shall be noted that the modules of the payment card 110 depicted herein are for exemplary purposes and the payment card 110 may include fewer or more modules to perform the various functions described herein.

[0041] The one or more input devices 302 enable the cardholder 106 to provide inputs via the payment card 110. For example, the payment card 110 may include a touchpad or electronic keypad to provide Personal Identification Number (PIN) for authenticating identity of the cardholder 106 using the payment card 110. The storage module 304 is a memory configured to store keypad input data, cardholder information and card information (e.g., type of card, type of cardholder membership, card number, name of the cardholder, cardholder's account number, Personal Identification Number (PIN), expiry date of the payment card 110, name of issuing bank, etc.). Examples of the storage module 304 may include a non-removable memory

and/or removable memory (e.g., RAM, ROM, flash memory, etc.). The storage module 304 may also be used for storing data and/or instructions.

[0042] The payment card 110 includes the power supply 306 which includes a thin battery or a capacitor used to power the modules of the payment card 110, for example, the input devices 302 and the display module 314. In an alternate embodiment, the payment card 110 may or may not need a battery, wherein the payment card 110 is configured to be powered when inserted into a terminal such as a POS machine 104.

[0043] Optionally, the payment card 110 includes a processing module 310 which executes the instructions to perform functions such as, read a keypad press, to store a keypad input, etc. The processing module 310 can be a signal processor, microprocessor, ASIC, or other control and processing logic circuitry for performing such tasks as signal coding, data processing, input/output processing, power control, and/or other functions.

[0044] The communication module 308 includes communication circuitry, for example, one or more antennas, to support two-way communications between the storage module 304/processing module 310 and external devices (e.g., POS machine 104, cardholder device 108), as is well understood in the art. The communication module 308 is shown generically and can be configured with wireless communication modules that enable transfer of data from the payment card 110 to the POS machine 104 or any merchant device/cardholder device 108 over short ranges/distances. Examples of the communication module 308 include Bluetooth®, WiFi®, Near Field Communication (NFC)®, etc.

[0045] The display module 314 is configured to facilitate display of the credit rating of the cardholder 106. In an example, the credit rating may be displayed as a numerical value on a display section 362 (see, **FIG. 3B**) of the payment card 110. In another example, the credit rating of the cardholder 106 may be indicated by display of one or more colors on a display section 362. Without loss of generality, in an example, a green color may be displayed on determining a good credit rating of the cardholder 106 and red colour may be displayed on determining very low credit rating of the cardholder 106. It shall be noted that the display section 362 may employ any different display technique other than the techniques described above to display the credit rating of the cardholder 106.

[0046] In an embodiment, the payment card 110 may be configured such that when the payment card 110 is inserted into a card reader module at the POS machine 104 or held close to the NFC terminal (configured within the POS machine 104 or the cardholder device 108), the electrical components of the payment card 110 are powered ON and the display section 362 displays the credit rating of the cardholder 106 on the payment card 110. More specifically, the credit rating determined by the system 150 is received by the payment card 110 via the communication module 308 and displayed on the display section 362. Some examples of the display module 314 include but not limited to, a light emitting diode display, a thin-film transistor (TFT) display, and the like. An example of the payment card 110 displaying the credit rating is shown and explained with reference to **FIG. 3B**.

[0047] **FIG. 3B** illustrates a schematic representation 350 of the payment card 110 for dynamically displaying credit rating associated with the payment card 110. The payment card 110 includes information such as name of issuing bank 352, card number 354, name of the cardholder 356, expiry date of the payment card 358, printed on a first side of the payment card 110. The other side (i.e., the second side) of the payment card 110 which is not shown in FIG. 3B includes information such as a Card Verification Value (CVV) number and other information as may be already known in the art. A storage chip 360 stores information corresponding to the payment card 110 and the cardholder 106. The payment card 110 includes the display section 362 that displays the credit rating of the payment card 110. In some example embodiment, the payment card 110 includes a power button 318, such as, an electronic or a mechanical key which can be powered ON for activating/deactivating the payment card 110. When the payment card 110 is turned ON, the display section 362 dynamically displays the credit rating. More specifically, when the payment card 110 is inserted into a card reader device, for example, card reader device of the POS machine 104, the electrical components of the payment card 110 are powered ON and the communication module 308 receives the credit rating information from the system 150 via the communication interface 208 and stores in the storage chip 360. As such, the cardholder 106 may be aware of his/her credit rating prior to availing a loan or purchasing a product on credit. Such dynamic determination and display of the credit rating on the payment card 110 may be used by the cardholder 106 to evaluate his/her likelihood for availing loan/purchasing on credit. As such, the cardholder 106 may display the payment card 110 displaying the credit rating to the agent at the merchant facility 102 for purchasing the product on credit.

[0048] In another embodiment, the payment card 110 may not include the display section 362, and as such, the POS machine 104 may display the credit rating of the cardholder 106. More specifically, the communication interface 208 of the system 150 transmits the dynamically determined credit rating to the POS machine 104 when the cardholder 106 initiates a transaction using the payment card 110 via the POS machine 104. In another embodiment, the credit rating may be displayed on the cardholder device 108 associated with the cardholder 106. An example of a UI configured to display the credit rating for the cardholder 106 is shown and explained with reference to **FIG. 4**.

[0049] **FIG. 4** illustrates an example representation of a UI 400 displayed to the cardholder 106 on a display screen of the cardholder device 108 for indicating the credit rating associated with the cardholder 106, in accordance with an example embodiment. In an embodiment, the UI 400 is presented by an application interface. The application interface is a software application facilitated by the payment server 116 or the issuer server 112. When the cardholder 106 intends to check credit rating of the cardholder 106, the cardholder 106 may access the application interface and select an option associated with checking credit rating of the cardholder 106. The UI 400 may be presented to the cardholder 106 on selecting the option associated with checking the credit rating. It shall be noted that display of the UI 400 is explained herein for exemplary purposes and the UI 400 may be displayed on selecting different options or may be displayed on a home page of the application interface and may not be considered as limiting the scope of the disclosure.

[0050] The UI 400 is depicted to display a greeting for the cardholder 106. Further, the UI 400 is depicted to display fields such as evaluated risk factor of the cardholder 106 (shown as ‘CREDIT RATING’) and one or more behavioral parameters (shown as ‘PAYMENT HISTORY’, ‘CREDIT USAGE’, ‘AGE OF CREDIT’). Values for the evaluated risk factor and the one or more behavioral parameters are displayed beside the respective parameter and indicate a quantified value of the risk associated with the cardholder 106 and cardholder behavior, respectively. It shall be noted that the one or more behavioral parameters depicted here are for exemplary purposes only and the system 150 may determine additional or fewer parameters and as such the UI 400 may include fewer or more behavioural parameters of the cardholder 106. Further, it shall be noted that the credit rating and behavioural parameters may be depicted in different data formats or presentations. In another example, a risk meter such as the one shown in UI 400 may be used to depict the credit rating of the cardholder 106.

[0051] In another embodiment, contents of the UI 400 may be embodied as a Short Message Service (SMS) or a notification on the cardholder device 108 when the cardholder 106 initiates a transaction. The process flow of dynamically determining credit rating for displaying on the POS machine 104, the cardholder device 108 or the payment card 110 is explained next with reference to **FIG. 5**.

[0052] **FIG. 5** is a flowchart illustrating a method 500 for dynamically determining credit rating. The method 500 depicted in the flow diagram may be executed by, for example, the system 150 shown and explained with reference to **FIGS. 2-4**. Operations of the flow diagram, and combinations of operation in the flow diagram, may be implemented by, for example, hardware, firmware, a processor, circuitry and/or a different device associated with the execution of software that includes one or more computer program instructions. The operations of the method 500 are described herein with help of the system 150. It is noted that the operations of the method 500 can be described and/or practiced by using one or more processors of a system/device other than the system 150, for example, the issuer server 112 or the payment server 116. The method 500 starts at operation 402.

[0053] At operation 502 of the method 500, credit related information and transaction information of a cardholder (e.g., the cardholder 106) associated with the payment card 110 are received from an issuer server 112 by a system, such as, the system 150, explained with reference to **FIGS. 2-4**.

[0054] At operation 504 of the method 500, one or more values corresponding to one or more behavioural parameters of the cardholder 106 are predicted based on the credit related information and the transaction information using one or more Artificial Intelligence (AI) models. Prediction of the one or more behavioural parameters of the cardholder 106 are explained with reference to FIG. 2 and is not explained herein for the sake of brevity.

[0055] At operation 506 of the method 500, a credit rating of the cardholder 106 is determined based on the one or more behavioural values

[0056] At operation 508 of the method 500, the credit rating of the cardholder 106 is provided to at least one of: the payment card 110 or the cardholder device 108 associated with the cardholder 106.

[0057] Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer-readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer-readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The term “computer-readable medium” should be understood to include tangible items and exclude carrier waves and transient signals, i.e., be non-transitory. Examples include Random Access Memory (RAM), Read-Only Memory (ROM), volatile memory, non-volatile memory, hard drives, Compact Disc (CD) ROMs, DVDs, flash drives, disks, and any other known physical storage media.

[0058] The described operations may be implemented as a method, system or article of manufacture using standard programming and/or engineering techniques to produce software, firmware, hardware, or any combination thereof. The described operations may be implemented as code maintained in a “non-transitory computer readable medium”, where a processor may read and execute the code from the computer readable medium. The processor is at least one of a microprocessor and a processor capable of processing and executing the queries. A non-transitory computer readable medium may include media such as magnetic storage medium (e.g., hard disk drives, floppy disks, tape, etc.), optical storage (CD-ROMs, DVDs, optical disks, etc.), volatile and non-volatile memory devices (e.g., EEPROMs, ROMs, PROMs, RAMs, DRAMs, SRAMs, Flash Memory, firmware, programmable logic, etc.), etc. Further, non-transitory computer-readable media may include all computer-readable media except for a transitory. The code implementing the described operations may further be implemented in hardware logic (e.g., an integrated circuit chip, Programmable Gate Array (PGA), Application Specific Integrated Circuit (ASIC), etc.).

[0059] The illustrated steps are set out to explain the exemplary embodiments shown, and it should be anticipated that ongoing technological development will change the manner in which particular functions are performed. These examples are presented herein for purposes of

illustration, and not limitation. Further, the boundaries of the functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternative boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed. Alternatives (including equivalents, extensions, variations, deviations, etc., of those described herein) will be apparent to persons skilled in the relevant art(s) based on the teachings contained herein. Such alternatives fall within the scope and spirit of the disclosed embodiments. Also, the words "comprising," "having," "containing," and "including," and other similar forms are intended to be equivalent in meaning and be open ended in that an item or items following any one of these words is not meant to be an exhaustive listing of such item or items or meant to be limited to only the listed item or items. It must also be noted that as used herein, the singular forms "a," "an," and "the" include plural references unless the context clearly dictates otherwise.

[0060] Furthermore, one or more computer-readable storage media may be utilized in implementing embodiments consistent with the present disclosure. A computer readable storage medium refers to any type of physical memory on which information or data readable by a processor may be stored. Thus, a computer readable storage medium may store instructions for execution by one or more processors, including instructions for causing the processor(s) to perform steps or stages consistent with the embodiments described herein. The term "computer readable medium" should be understood to include tangible items and exclude carrier waves and transient signals, i.e., are non-transitory. Examples include random access memory (RAM), read-only memory (ROM), volatile memory, non-volatile memory, hard drives, CD ROMs, DVDs, flash drives, disks, and any other known physical storage media.

[0061] Finally, the language used in the specification has been principally selected for readability and instructional purposes, and it may not have been selected to delineate or circumscribe the inventive subject matter. Accordingly, the disclosure of the embodiments of the disclosure is intended to be illustrative, but not limiting, of the scope of the disclosure.

[0062] With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

CREDIT CARD WITH DYNAMIC CREDIT RATING DISPLAY

ABSTRACT

The present disclosure relates to a method, system and payment card for dynamically displaying credit rating. As such, credit related information and transaction information of a cardholder associated with a payment card is received from an issuer server. The credit related information and transaction information of the cardholder are used for predicting one or more behavioural parameters associated with the cardholder. Further, the one or more values are used for determining a credit rating of the cardholder. The credit rating of the cardholder may be displayed on the payment card or cardholder device or on any merchant device facilitating transaction for the cardholder.

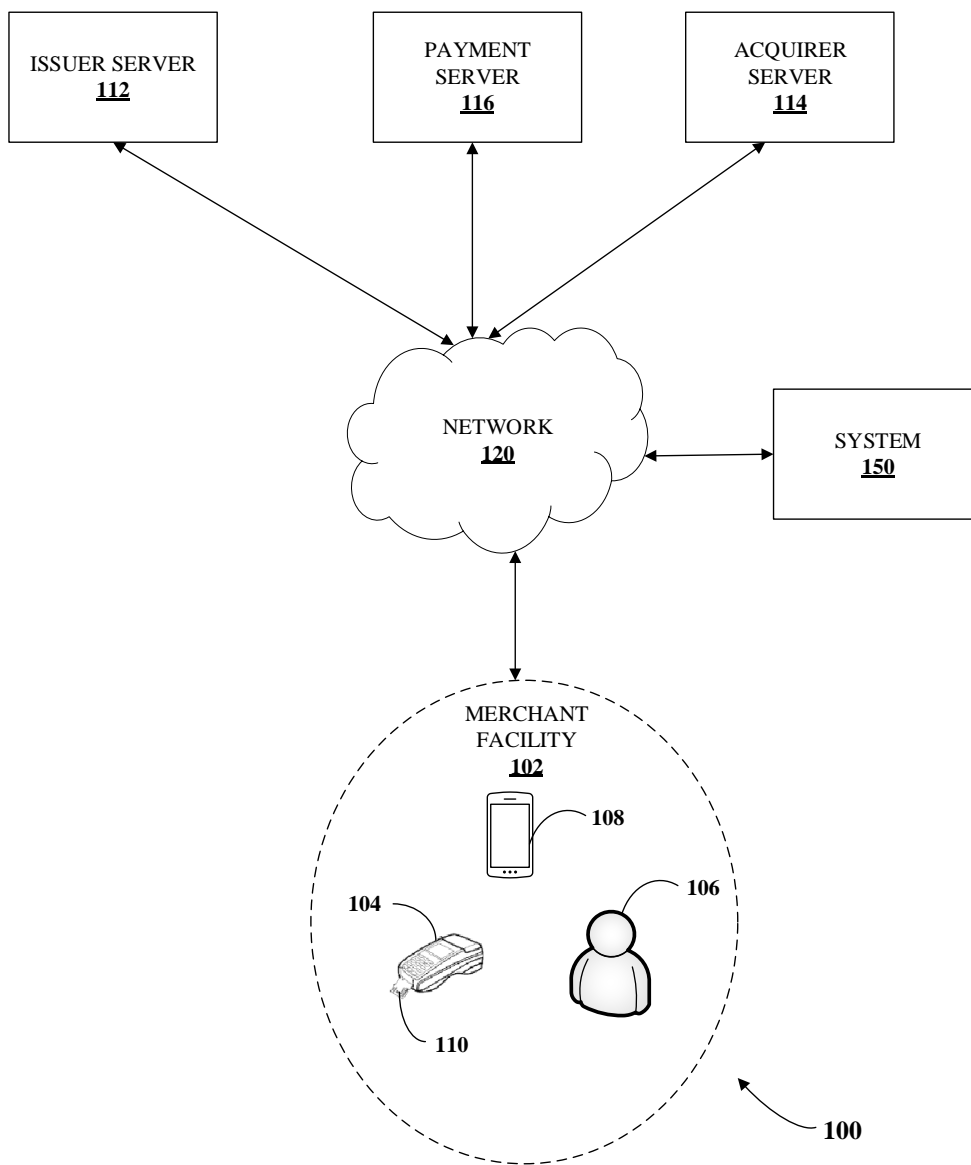


FIG. 1

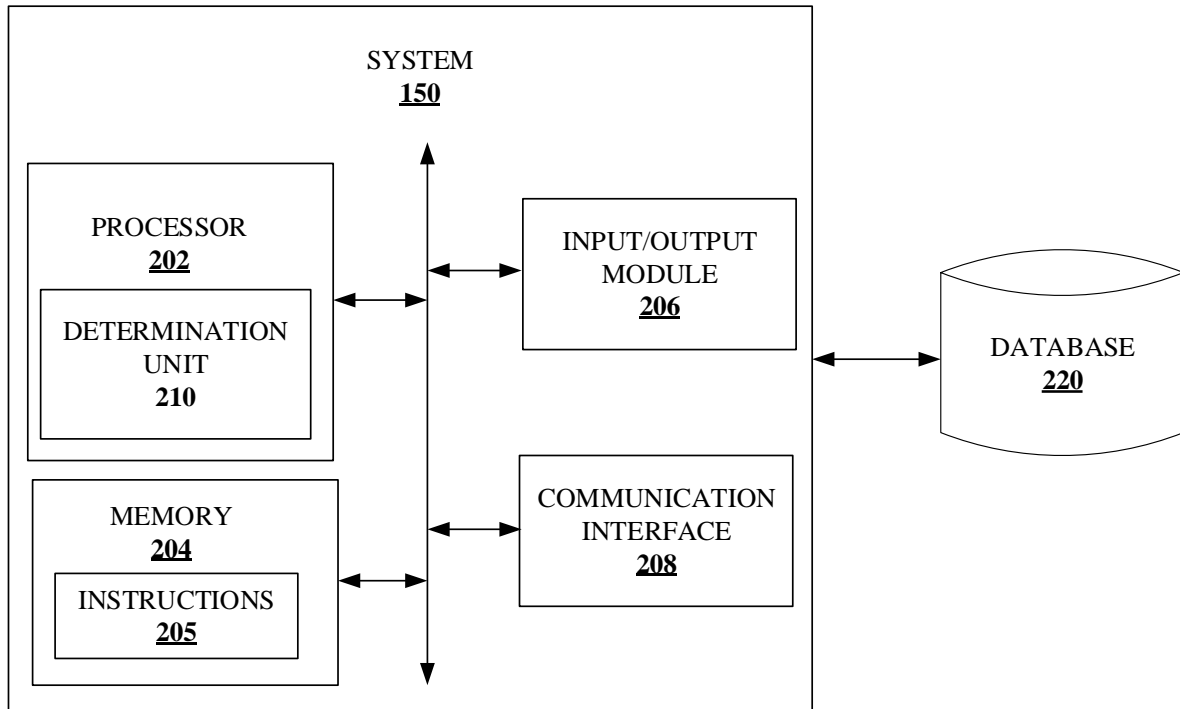


FIG. 2

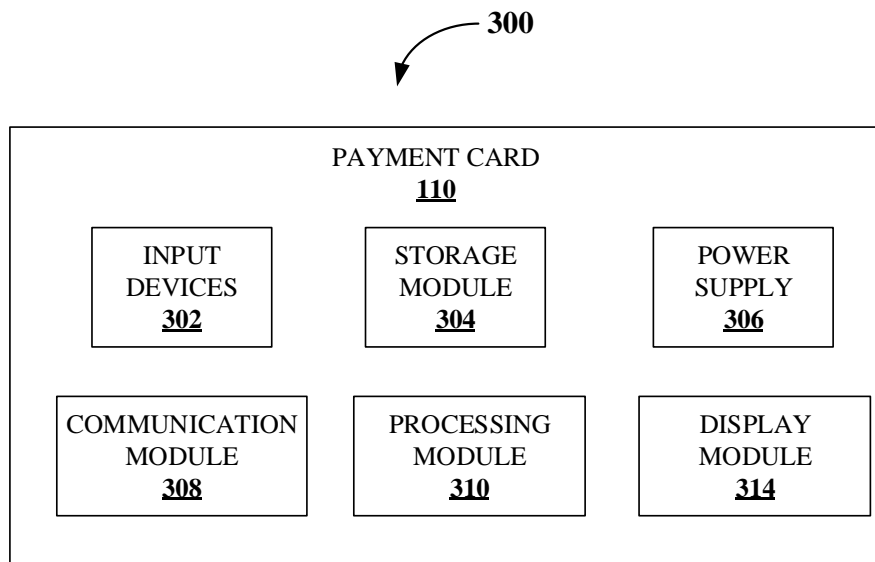


FIG. 3A

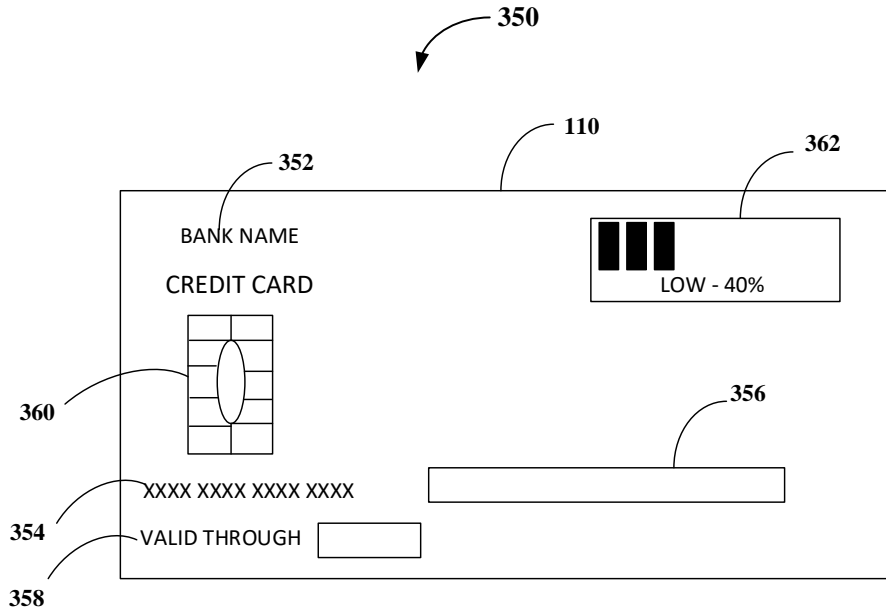


FIG. 3B

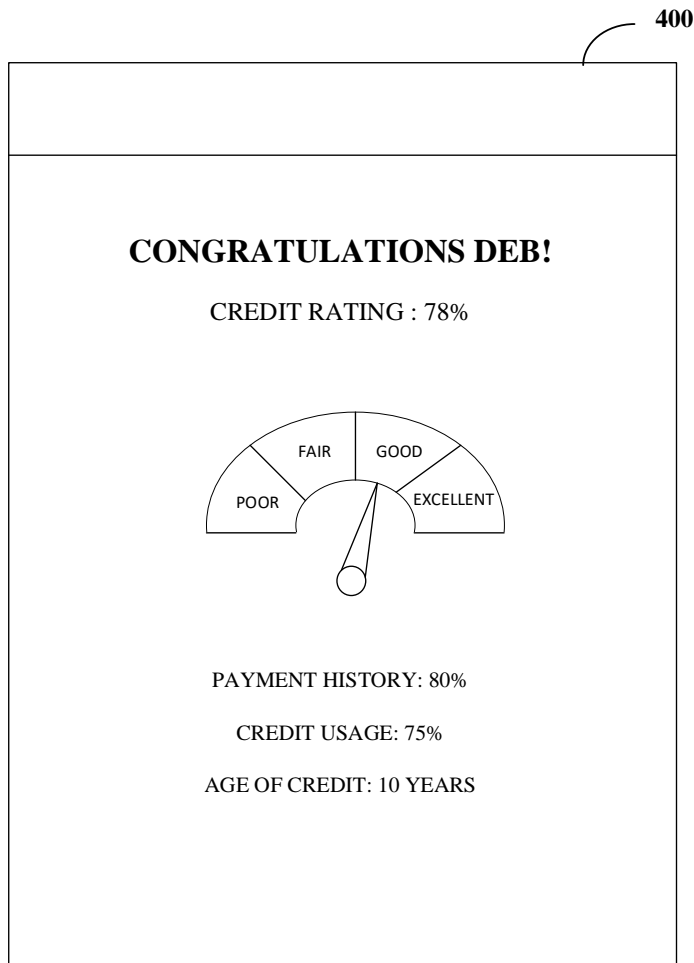


FIG. 4

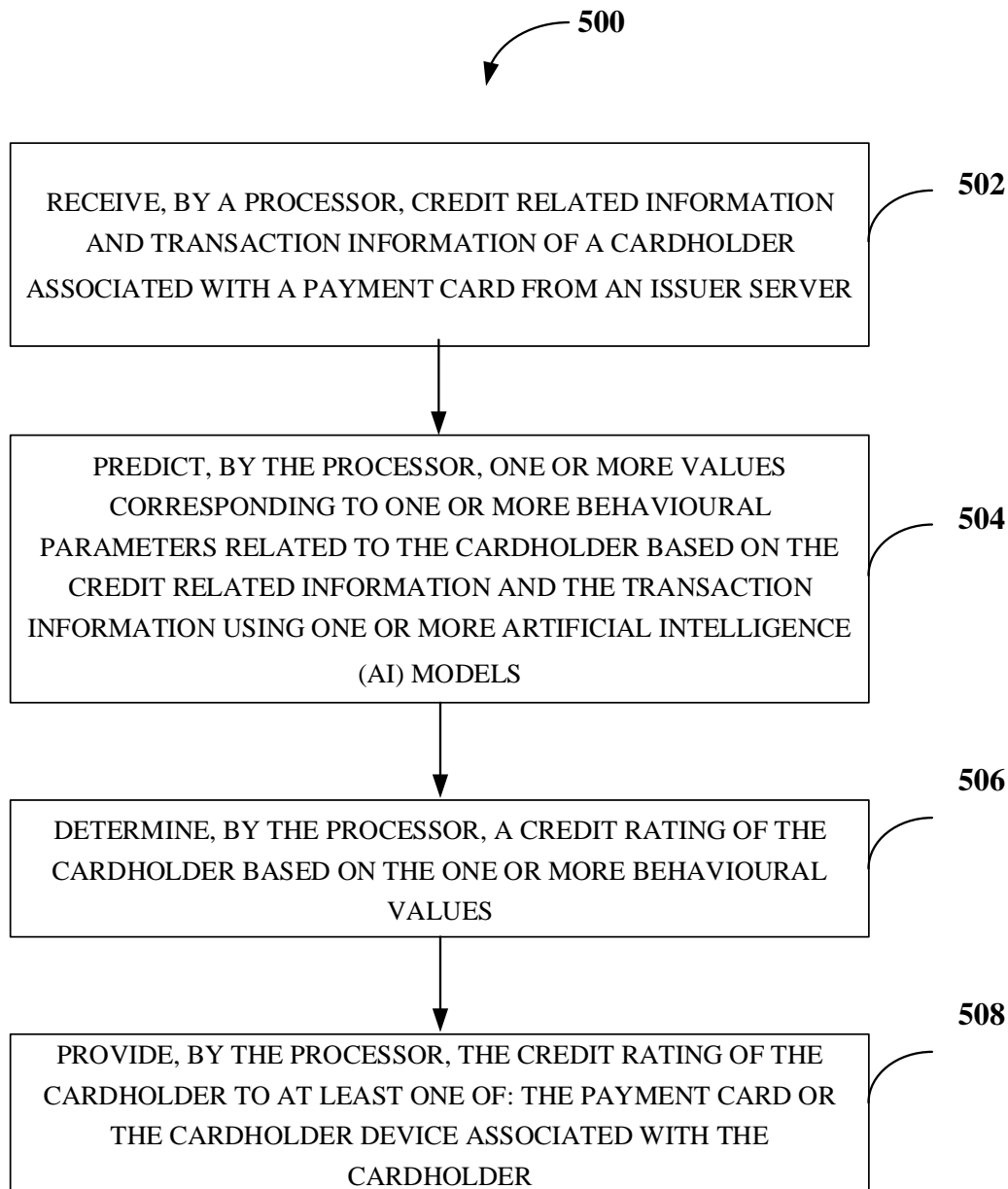


FIG. 5