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Optimization Tree Based Inference to Customer Behaviors in Dynamic Control System

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Abstract

Finance Technology (FinTech) appears along with changes in people's lifestyles which are currently dominated by users of fast-paced information technology. Fintech definition in Bank Indonesia regulation Number 19/12/PBI/2017 is the use of financial system technology that produces new business models and can have an impact on result in the efficient, secure and reliable payment system. Population customers in transactions and behaviour information factors. In this study Fintech uses personal financial management (PFM) which can provide analysis of personal financial analysis, personal financial health assessments, and financial product recommendation services consisting of investment products, insurance and tools to monitor and Optimization Trees Inference (OTI) control the level of expenditure to fit the planning targets customer finance, as well as providing online payment services that can help in the payment transaction process that is easier, flexible and fast. Result data 14 % – 50.00% and data correction 95%.

Keyword*; FinTech , Optimization, Decision Tree, Dynamic Control System, PFM.*

1. Introduction

Finance Technology (FinTech) appears along with changes in people's lifestyles which are currently dominated by users of fast-paced information technology. Fintech definition in Bank Indonesia regulation Number 19/12/PBI/2017 [1], is the use of financial system technology that produces new products, services, technology and/or business models and can have an impact on monetary stability, financial system stability[10], and also result in the efficient, secure and reliable payment system[6]. Financial technology provider includes payment systems, market support, investment management and risk management, loans, financing and capital providers, and other services financial [1,2,3]. Due to the latest developments in IT technology, various Fintech technologies are being developed. Especially, because of the need for mobile payment services that allow easy payment. [1]. As part of the solution that the fintech industry is trying to accommodate, the mobile payment service will be one of the influential factors, specifically in vertical fintech and in the wealth of landscape [3,4]. This is based on a statistic that shows that the growth of smartphones has exceeded the ownership of bank accounts. The education system in Indonesia has undergone a digital transformation. Technology plays an important role so that the education system continues to move dynamically and innovatively [12]. One of them is the use of mobile-based Fintech in the university [3]. Relationship are caused by a small co-occurrence, but the weakest strength relations is due to the high occurrence [5]. In this study, Fintech provides online payment services that can help students in the easier, flexible and fast payment transaction process [11]. Fintech uses personal financial management (PFM) which can provide personal financial analysis, personal financial health assessment, and financial product recommendation services consisting of investment products, insurance, and tools to monitor and control the level of expenditure to fit the target of customer financial planning [12].

2. State of the Art Payment Model

2.1 Mobile Payment Basic Architecture

a. Merchant : is a place that accommodates customer transaction details. The data includes static and dynamic elements that identify each transaction[13].

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b. Customers receive transaction data from the Merchant and match each information they have in which the standard payment format has been prepared to be able to process payments[6,8]. The payment process is via trusted partners such as a bank or telecommunications operator. When the payment request is ready to be transferred, the consumer checks and identifies with the PIN sent by the account manager[4].
c. The account manager will accept payment requests, identify customers and process payment requests. The identification process includes checking available funds and the amount requested. When the process is complete, the payment notice is forwarded to the data center as a payment service[11,12,13]. The data set then identifies the address of the bank/telco operator at the payment notice and then sends a message to the merchant to notify that the payment process has taken place[13].
d. The processor on the merchant side accepts the payment notice and provides real-time notification on whether the transaction is accepted or rejected[6].

2.2 Fintech model Architecture

Fintech uses API management as an intermediary that facilitates the exchange of information or data between two or more software applications that are integrated with content management systems [8,10], payment channels and personal financial management (PFM). In system management content, existing data is stored to be added or edited [13]. In the payment channel, the existing merchant is chosen by the user for the transaction [11,12]. Every transaction carried out is re-checked the correctness of the data and given insurance [13]. After completing it immediately, the next stage is payment by using a virtual account or direct payment online.

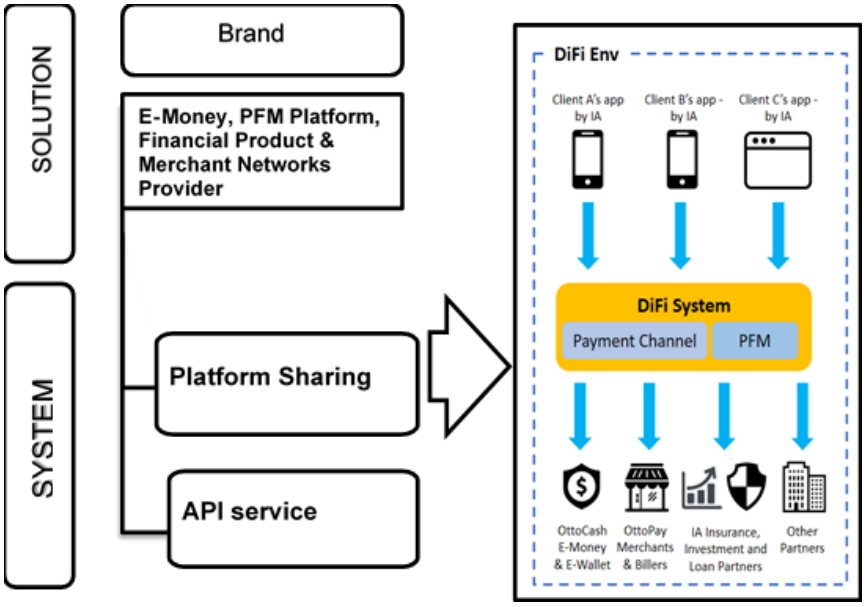
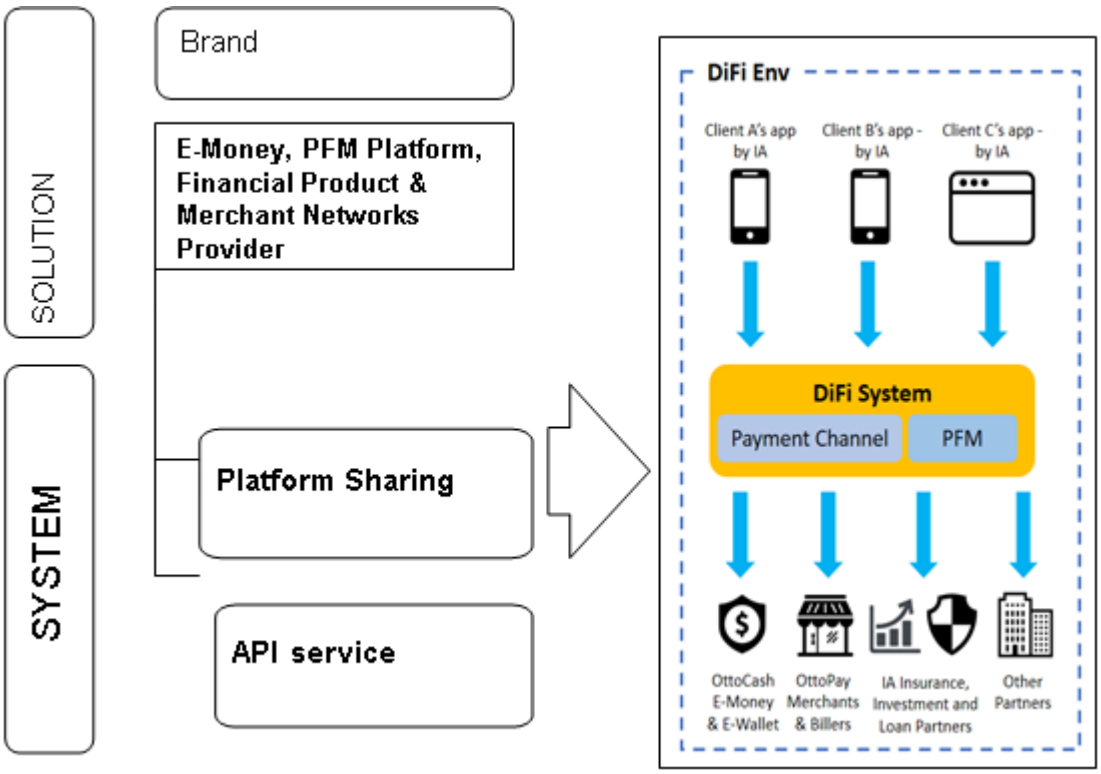


Figure 2.1 Payment channels and personal financial management (PFM)



3. Material and Method

3.1. Customer behavior in Varian transaction value

At the first step, each user registers by filling in their personal data. After the registration, the user can log in to enter the system. Various types of merchants are provided on the system [7,8]. Users can choose one of the available merchants to make the payment[6]. During the payment process, there are several choices given, payment via Indomaret or payment using a virtual account (if there is already a balance)[13].

Table 3.1 Population Customer Behaviour

Variable	Name customer	Total Count	Mean
varian Transaction	"Acep radian rumindar	1	12000
	"Adam gealzisabda	1	12000
	"Ade elisa ria br sitepu	1	12000
	"Ade firdaus	2	9250
	"Ade ningsih sitompul	1	12000
	"Adenensi pasaribu	2	12500
	"Adina saraswaty silitonga	1	12000
	"Aditya nugraha	1	12000
	"Agung prayogo	1	12000
	"Agus purba	2	12500
	"Agus riyanto	2	12000
	"Agus setiawan	3	8333
	"Agustina riyah	2	28250
	"Ahmad fauzi ritonga	1	6500,0
	"Ahmad muhajir	2	12500
	"Aida julpa	1	12000

Table 3.1 This data take that to find mean of behavior of user in transaction value. With the intention of look for further assessment indicators value.

3.2. Personal Financial Management (PFM)

a. Assessment of personal financial analysis
b. Assessment of Personal financial health
c. Financial Product recommendation service consisting of Investment and Insurance products[7,8]
d. Tools to monitor and control the level of expenditure to meet the customer's financial planning goals.

Tree Based method partition the feature space into a set of rectangles', and then fit simple model (like a constant) in each one. In this paper lets consider a regression problem with continuous respond Y and input x_1 and x_2, each talking value in the unit interval [5]. We first split the space into two regions, and model the response by the mean of Y in each region. We choose the variable and split-point to achieve the best fit. Then one or both of these regions are split into two more regions, and this process is continued, until some stopping rule is applied [13]. For in this research, in the top right panel of Figure 3.1, we first split at $x_1 = t_1$. Then the region $x_1 \leq t_1$ is split at $x_2 = t_2$ and the region $x_1 > t_1$ is split at $x_1 = t_3$. Finally, the region $x_1 > t_3$ is split at $x_2 = t_4$. The result of this process is a partition into the five regions $R_1, R_2, \ldots, R_5$ shown in the figure. The corresponding regression model predicts Y with a constant c_m in region R_m, that is.

$$\check{f}(X) = \sum_{m=1}^{5} C_m \, I\{(X_1, X_2 \in \beta_m)\} \quad (1)$$

Observations satisfying the condition at each junction are assigned to the left branch, and the others to the right branch. The terminal nodes or leaves of the tree correspond to the regions $R_1, R_2, \ldots, R_5$.

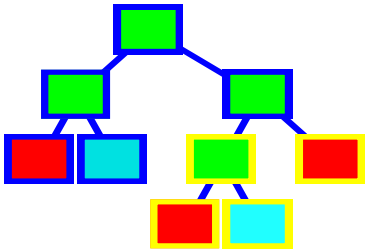


Figure 3.1 Classification Tree Topology

4. Result and Discussion

We generated optimization a samples of size N= 370, with two classes and p = 3 features, each having a standard distributed with pairwise correlation 0.90.

The response Y was generated according to

$$Pr\,(Y = 1 | x_1 \leq 0.5) = 0.1. \quad (2)$$

$$Pr\,(Y = 1 | x_1 \geq 0.5) = 0.85. \quad (3)$$

In case sample data set of size 1500 was also generated from the population. In this paper we fit classification trees to the training sample and each of 771. Table 4.1 show the originals trees have height variance due to correlation in predictors. Bagging success in smoothing out this variance and hence reducing the test error.

Table 4.1 Result Population customer behaviour

No	Data Value	N Trees	% Wgt	Count	%
1.	"Adam Gealzisabda	2	0.28	5	0.50
2.	"Ade ningsih sitompul	1	0.14	2	0.21
3.	"Ahmad muhajir	2	0.28	4	0.40

4.	"Alfi widia astuti	2	0.28	2	0.28
5.	"Andre syahputra	1	0.14	1	0.14
6.	"Acep Radian Rumindar	1	0.14	2	0.28
7.	"Ade Elisa Ria BR Sitepu	1	0.14	2	0.28
8.	"Ade Firdaus	2	0.28	2	0.28
9.	"Adenensi Pasaribu	2	0.28	2	0.28
10.	"Adina Saraswaty Silitonga	1	0.14	1	0.14
11.	"Aditya Nugraha	1	0.14	1	0.14
12.	"Agung Prayogo	1	0.14	1	0.14
13.	"Agus Purba	2	0.28	2	0.28
14.	Agus Riyanto	2	0.28	6	0.60
15.	"Agus Setiawan	3	0.42	3	0.42
16.	"Agustina Riyah	2	0.28	2	0.28
17.	"Ahmad Fauzi Ritonga	1	0.14	2	0.28
18.	"Aida Julpa	1	0.14	1	0.14

The results from table 4.1 can be seen of the user and user name by observing the running of the business transaction the number of activities that arise in the transaction makes it difficult for us if we do not do an optimization approach in making a decision. Optimization base on tree, the activity of the user behavior "Adam Gealzisabda "," Ade ningsi sitompul "this looks routine in the transaction is quite high. In the optimization from table 4.2.

Table 4.2 Optimization trees to customer population level value

No	Trees	Misclass	Learning	Testing AVg LL	Data Value
1.	0.8163	0.5000	1.540	1.653	"Adam Gealzisabda
2.	0.8163	0.4504	1.533	1.653	"Ade ningsih sitompul
3.	0.8163	0.4504	1.524	1.652	"Ahmad muhajir
4.	0.8163	0.4501	1.474	1.652	"Alfi widia astuti
5.	0.8163	0.4495	1.461	1.642	"Andre syahputra
6.	0.8163	0.4489	1.422	1.636	"Acep Radian Rumindar
7.	0.8163	0.4486	1.394	1.635	"Agus Setiawan
8.	0.8163	0.4486	1.389	1.630	"Agus Riyanto
9.	0.8163	0.4486	1.355	1.628	"Ade Firdaus
10.	0.8163	0.4480	1.342	1.618	"Agustina Riyah
11.	0.8163	0.4477	1.359	1.618	"Ahmad Fauzi Ritonga
12.	0.8163	0.4474	1.340	1.618	"Aida Julpa

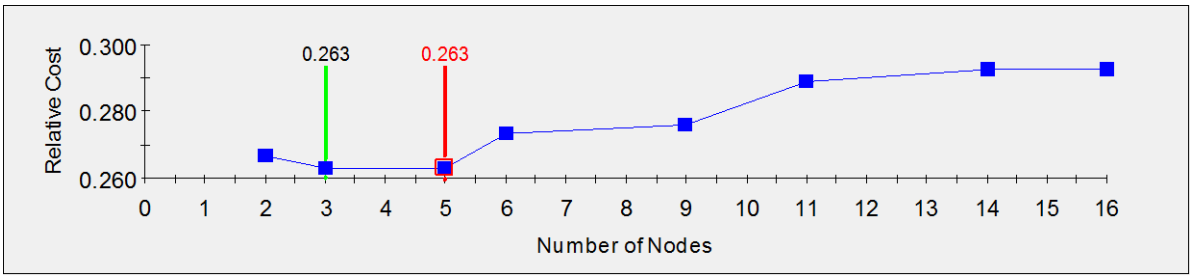


Figure 4.1 Growth Relative Cost Transaction Customer

Table 4.3 Tree Based Score Results

Node	Cases	Percent Score Data	Percent Train Data	Node Class	Percent Correct
1	157.00	22.08	22.08	43466	95.00
2	183.00	25.74	25.74	43497	95.00
3	120.00	16.88	16.88	43556	95.00
4	194.00	27.29	27.29	43525	95.00
5	38.00	5.34	5.34	43586	95.00
6	19.00	2.67	2.67	43617	95.00

In table 4.3 that the aftereffects of the appraisal scores are tried dependent on the information base utilizing trees. This examination, is filled enhancement in settling on choices with an assortment of multi varieties, just as the decent variety of information in taking a gander at the equalization and trademark designs that will be made from an inference based on tree improvement.

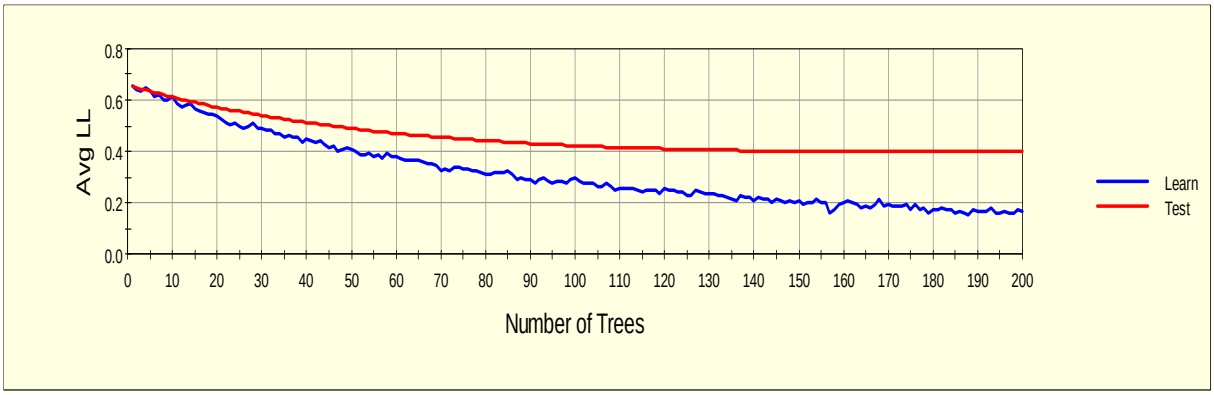


Figure 4.2 Result average learn and data testing

5. Conclusion and Future Work

The tree base optimization approach can easily decision management for population user behavior in fintech, that in optimizing tree-based it is very effective. Future work in digital payment services and financial management customer behaviors. In predicting the level of users, further research can be used such as General Partial Linier Model, Robust GPLM.

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