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Gift Recommendations Based on Personality Using Fuzzy and Big Five Personality Test

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Abstract

Gifts are usually given to someone to strengthen a relationship or to motivate someone. However, givers often need help determining the appropriate gift for the potential recipient. On the other hand, many recipients are disappointed with the gifts received. This event can result in the relationship between the giver and recipient being disrupted or the motivational goal not being achieved. This research aims to develop a system to recommend gifts based on the recipient's personality. Gift recommendation is determined based on the recipient's personality because the recipient highly values gifts that match the recipient's personality. The system is built using the Fuzzy method, and the personality measurement tool used is the Big Five Personality Test. Fifteen pairs of respondents validated the system. The validation results show that 80% of respondents as gift-givers strongly agree that the system helps determine the appropriate gift for someone. In addition, 73.33% of respondents as gift recipients strongly agree that the gifts recommended by the system do not disappoint them.

Keywords: gift recommendation, personality, big five personality, Fuzzy

1. Introduction

Communities in some areas of the world have the custom of giving gifts to others at certain times, such as weddings, birthdays, Christmas, and New Year. In addition, gifts are also used to motivate someone or to strengthen relationships [1]. In companies, gifts motivate employees to be more productive [2]–[4]. In education, gifts are usually used to increase student learning motivation/achievement [5], [6]. Generally, a gift is defined as a gift to another person, a reward for an achievement, or a memento [7]. Giving to others is done as a memento, honor, or appreciation. Giving to others is done as a memento, honor, or appreciation.

Every gift giver hopes the gift can be unforgettable for the recipient [8]. A gift given to someone is not always pleasing to the recipient. The results of a survey conducted by Anggraini stated that 84% of respondents who received Christmas and New Year gifts did not like the gifts they received, although only a few admitted it [9]. As a result, unwanted gifts will be given to other people, thrown away, or returned to the gift giver. Incidents like this caused disappointment for both parties and can even cause bad relations [10], [11].

Incorrect gifts result when the gift giver needs to know what gift is desired or appropriate for the potential recipient. According to Pizzetti (2016), a gift that matches the personality of the potential recipient will be highly valued by the potential recipient [12]. However, many types of gifts can be given to someone with a certain personality so that people with the same personality can receive different gifts. In addition, each person's personality is different, so the gifts given to someone are likely to differ from those given to others. This results in gift-givers often needing clarification about finding gifts or the right location to find gifts.

The author's survey of 78 respondents with the help of Google Forms reinforced the above. Respondents have an age range from 12 years to 45 years with various work backgrounds. Each respondent was asked to give his opinion as a gift recipient and as a gift giver. The survey results from the side of the gift giver show that the biggest obstacle for the gift giver is choosing the right gift (61.5%), and 62.8% of respondents feel worried if the gift given does not match the expectations of the potential gift recipient. So far, 91% of respondents determined gifts based solely on instinct by browsing the internet, and 61.5% consulted with friends (each respondent could answer more than one). However, respondents still need help to make the right choice because of the many choices available, adjusting the price of gifts that match the budget, and

recommendations from friends that do not match the thoughts of the gift giver.

The survey results show that around 40% of respondents were disappointed with the gift they received. Some of the reasons put forward were because the gifts given were not following needs, were not useful, were not following what the recipient liked, and was of poor quality. As a result, the gifts received become trash.

Several studies related to reward recommendation systems, the relationship between rewards and personality, and recommendation systems using the Fuzzy method have been carried out before. Research conducted by Pereira et al. (2017) proposed a gift recommendation algorithm for mobile devices using the iOS operating system. The algorithm was developed based on adjustments to the COREL framework. Recommendations are given based on products that users and user preferences have rated in the Gifter application [13]. The weakness of this recommendation system is that a product with a good rating or following the gift giver's preference may not necessarily meet the expectations or needs of the potential gift recipient.

Unlike the research conducted by Pereira et al. (2017), Shruti et al. (2018) designed a gift recommendation system using a hybrid approach that combines the Content-Based Recommendation method with Collaborative Filtering [14]. The researcher's purpose in building a gift recommendation system is to increase sales of an e-commerce website. Adiman and Guntara [15] conducted the same research. The workings of the gift recommendation system begin with looking for similarities in profiles of users who request recommendations from other users using the Collaborative Filtering method. Furthermore, from users with the same profile as the user requesting recommendations, a common interest in existing products is sought using the Content-Based Recommendation method. Products that have the highest demand are recommended products. However, profile similarities, especially general profiles (e.g., gender and age) between users, do not necessarily indicate the similarity of interests and personalities between users.

The relationship between reward and psychological aspects was investigated by Pizetti [12]. Pizetti stated that the potential recipient of the gift would highly appreciate a gift that matches the personality of the potential recipient. On the other hand, gifts that do not follow the personality of the potential recipient but follow the giver's personality can be considered coercion by the potential recipient.

Mar'i et al. (2018) developed a system for determining the proper professional recommendations for someone using the Fuzzy Tsukamoto method. Recommendations are determined based on personality assessed using the Big Five Personality Test. The five personality indicators used are extraversion, agreeableness, conscientiousness, neuroticism, and openness. The variables used to assess each personality indicator are taken from research conducted by Ramdhani. There are 43 variables used, namely: nine variables for indicators of extraversion, nine variables for indicators of agreeableness, nine variables for indicators of conscientiousness, seven variables for indicators of neuroticism, and nine for indicators of openness [16]. To find out the performance of the system being built, Mar'i, et al. (2018) measured the accuracy of the system using 22 test data. Accuracy is measured by comparing the results of professional recommendations from the system with those based on the rules used in the Top Ranked Personality-Based Work Styles for 22 Job Families. The test results show that the system built has an accuracy of 63%; 14 of 22 test data have the same recommendation results [16]. The researcher stated that the resulting accuracy value can still be improved by optimizing the determination of the membership function.

In this study, an application was built to help recommend gifts according to the personality of the potential recipient. So the research conducted combines Science and Psychology by utilizing technology. The personality of the potential gift recipients will be evaluated based on a psychological test, namely the Big Five Personality (BFP). The variables used to measure each indicator in the BFP, the inference rules, and the gift categories for each inference rule were developed with the help of two Psychologists. This is different from previous research conducted by Mar'i et al. (2018), which only used reference data from previous researchers [16]. In addition, our research continues beyond recommending gift categories. However, it is developed further by determining specific gifts according to the limitations of the potential gift giver (gender, age, moments, and hobbies of the potential gift recipient, as well as the budget provided by the gift giver) and suggestions of web addresses where to buy gifts.

2. Research Methods

The research was conducted in two stages. In the first stage, data collection is carried out to form reference data that will be used in the second stage. Meanwhile, in the second phase, a gift recommendation system will be developed based on the personality of the potential gift recipients. The steps taken in the first stage can be seen in Figure 1, while the steps taken in the second stage can be seen in Figure 2.
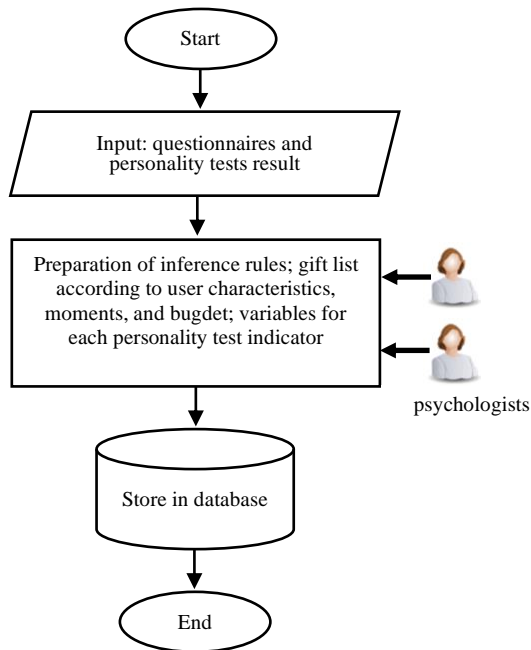
Figure 1. First Phase Research Methodology

The first phase of the research began with collecting data through online questionnaires with the help of Google Forms. In addition, respondents were also asked to take a test to find out their personality of the respondent. Seventy-eight respondents responded to questionnaires aged between 12 to 45 years. The results of the questionnaires and personality tests are used to develop inference rules, the variables to assess each personality indicator of the potential gift recipients, and to compile a list of gifts for each category. Gifts are based on the characteristics of the potential gift recipients and the moment of awarding the gifts. The data form will be stored in a database and used as reference data in the award recommendation process.

The method used in the second stage to recommend a gift that best suits one's personality is the Fuzzy Tsukamoto algorithm. The recommendation begins with determining the potential gift recipient's personality, gender, age, moments, hobbies, and the price range of the gifts to be given. The personality of the gift recipient is determined based on the test results from the BFP. In this test, gift givers are asked to assess potential gift recipients by giving a score (0-5) to each statement given. The higher score indicates that the respondent agrees more with the statement.

BFP is a test tool to determine a person's characteristics, patterns of thinking, or behavior that tend to be consistent from time to time. The indicators used in BFP are extraversion, agreeableness, conscientiousness, neuroticism, and openness.
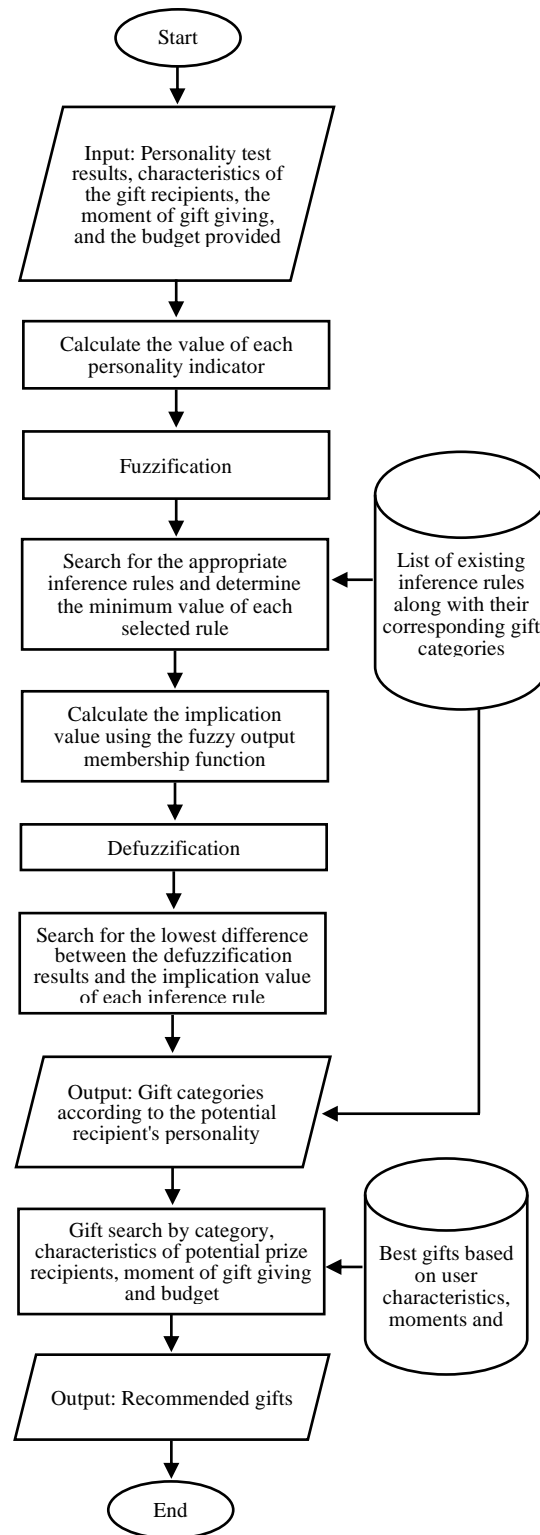

Figure 2. Second Phase Research Methodology

Extraversion is used to determine socialization ability. A high score on extraversion indicates that the person is very social. Agreeableness determines the nature of compassion, respect, and ease in accepting others. Conscientiousness is used to determine responsibility

and productivity in carrying out tasks. Neuroticism is used to determine the level of a person's negative emotions. Finally, openness is used to identify interest in science, art, and imagination.

Based on the assessment results with BFP, fuzzification was carried out to determine the degree of membership of each BFP indicator. Three membership functions are used to determine the degree of membership of each BFP indicator, namely low, medium and high membership functions [16] [Mar'i, F., Mahmudy, W. F., & Yusainy]. The moderate membership function used is in the form of a triangular function, while the low and high membership functions used are in the form of ascending and descending linear functions (Figure 3).
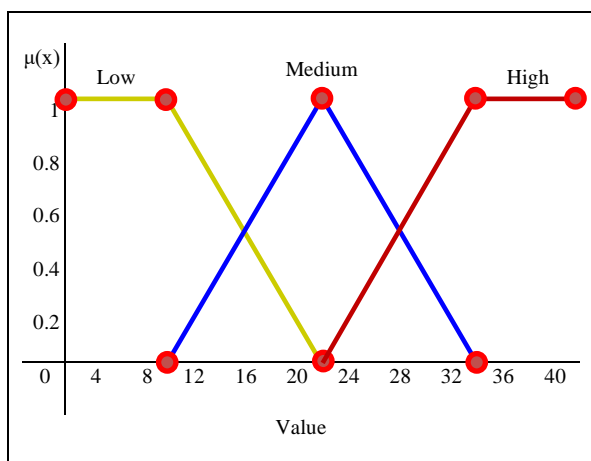

Figure 3. Input Membership Function

Furthermore, the inference process is carried out, namely looking for appropriate inference rules based on the results of the fuzzification process. Based on the rules obtained, the minimum value of the membership degree and each rule's output are calculated.

After the inference process is complete, the implication value is calculated using the minimum value resulting from the inference process and the output membership function. The Fuzzy output membership function used for the low and high categories is linear. Meanwhile, the Fuzzy output membership function used for the medium category is in the form of a triangular function (Figure 4) [16] [Mar'i, F., Mahmudy, W. F., & Yusainy]. The formula for calculating the implication value can be seen in Equation 1.

$$z = z_{\max} - a(z_{\max} - z_{\min}) \qquad (1)$$

Where z is the crisp value of the output of the inference process, Zmax is the highest value of the membership function of the Fuzzy output, Zmin is the lowest value of the membership function of the Fuzzy output, and a is the minimum value of the degree of membership obtained from the inference process.
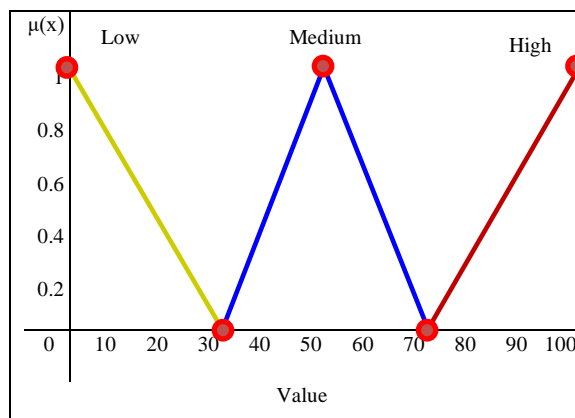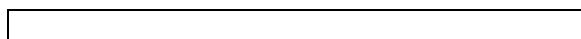

Figure 4. Ouput Membership Function

The results of the implication process are used to defuzzify using Equation 2.

$$z = \frac{\sum_{i=1}^{n} a_i * z_i}{\sum_{i=1}^{n} a_i} \qquad (2)$$

Where z is the result of defuzzification, n is the number of rules obtained from the inference process, a_i is the minimum degree of membership of the i-th rule, and z_i is the implication value of the i-th rule.

The rule with the smallest difference between the implication value and the result of the defuzzification is used to determine the appropriate gift category. A recommended gift search was conducted based on these gift categories, the characteristics of potential gift recipients (gender, age, and hobbies), the moment of gift giving, and the available budget. The list of gifts according to the characteristics of recipients and the moment was prepared with two Psychologists. The results were stored in a database.

A gift recommendation system according to personality is made in a mobile application. Validation is carried out to evaluate the performance of the system created. Validation was carried out on 15 respondents who were selected using the simple random sampling method. Each respondent was asked to find a partner who knew the respondent well. For each pair of respondents, each respondent was asked to run the application to get the right gift recommendation for their partner. After that, all respondents were asked to fill out two satisfaction questionnaires, one as a gift giver and one as a gift recipient. Respondent satisfaction is measured using a value between zero to five. A zero value indicates that the respondent strongly disagrees with the statement. While the value of five states that the respondent strongly agrees with the statement.

3. Results and Discussions

The number of rules formed based on the results of questionnaires and personality tests from 78 respondents is 243 rules. Examples of inference rules that are formed can be seen in Table 1.

In addition to forming inference rules, it determines which variables will be used to assess each indicator. The variables used to assess each indicator were compiled based on the results of discussions with two psychologists who were assistants in the research conducted. The list of variables used for each indicator can be seen in Table 2.

Table 1. Inference Rules

Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness	Output	Gift
Low	High	High	Medium	Low	High	Praying stuff
Medium	Medium	Medium	Medium	Low	Medium	Health Support Products
Low	Low	High	Medium	Low	Low	Sports Equipment
High	Medium	Low	Medium	Low	Medium	Bouquet
Low	Low	High	Medium	High	Medium	Books and Stationery
Low	Low	Medium	Low	High	Low	Decor
Low	Low	Medium	Low	Low	Low	Fashion Equipment
Low	Low	High	Low	Low	Low	Time Reminder Tool
High	Low	Medium	Low	Low	Low	Appearance Support

Table 2. Variables of Each BFP Indicator

Indicator	Variable
Extraversion	Enjoy socializing
	Comfortable in a crowd
	Jovial
	Loves to be the center of attention
	Friendly
	Nice to start the conversation
	Nice to meet new people
	Don't think long before speaking
Agreeableness	Easy to trust the others
	Helper
	Polite
	Sympathy
	I don't like taking advantage of other people
	Religious
	Like to volunteer
	Liked by his friends
conscientiousness	Religious
	Obey the rules
	Struggle to reach the target
	Discipline
	Full of consideration
	Pay attention to details
	Don't like to make a mess
	Like something structured and scheduled
neuroticism	Easily Anxious
	Easy to get angry
	High stress
	Shy
	Fragile
	Easily nervous
	Quitter
	Mood changes are quite drastic
openness	Loves art
	High curiosity
	Full of imagination
	Creative
	Likes to try new things
	Enjoy creating abstract concepts
	Easy to accept new things
	Adaptable

The trial was carried out by asking 15 pairs of respondents to run the gift recommendation application. Each pair member is asked to run the application as a gift giver to their partner. The results of the recommendations the application gave are then validated by asking for input from respondents as potential gift recipients regarding the suitability of the gifts recommended by the application with the desired gifts. The validation results from the side of the gift recipients can be seen in Figure 5. Based on Figure 5, it can be seen that 73.33% of respondents strongly agree that the gifts recommended by the system follow the desired gifts. This is following research conducted by Pizetti. Pizetti stated that a gift that matches the personality of the potential recipient of the gift has a high probability of being accepted by the potential recipient of the gift. High acceptance from potential gift recipients makes both parties feel satisfied.
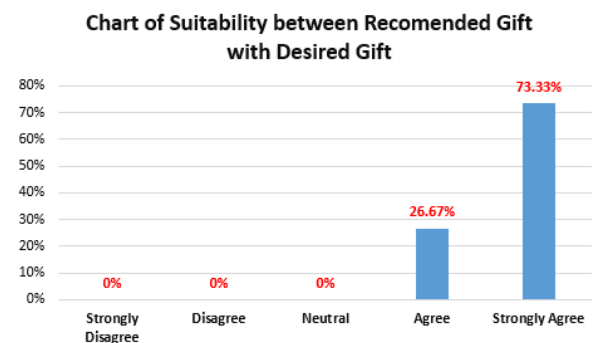

Figure 5. Compatibility of App Recommended Gifts with Desired

In addition, validation was also carried out from the side of the gift giver related to the benefits of the application, namely the ease in determining the right price for potential gift recipients. The results of the validation can be seen in Figure 6. Figure 6 shows that 80% of respondents strongly agree that the system developed is beneficial in determining the right gift for someone. Exactly what is meant here is that the gift can be well received by the recipient of the gift and following the budget planned by the gift giver. So, with this system, respondents can relax if the gifts given do not match the

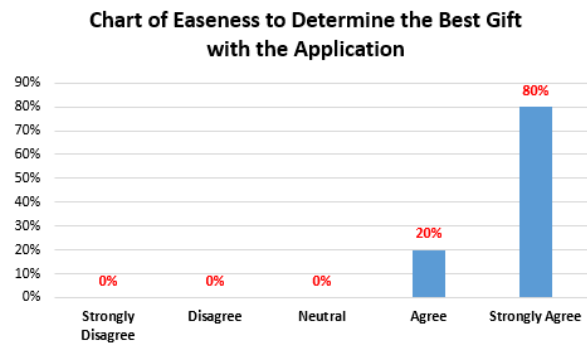expectations of potential gift recipients. In addition, gift givers also can easily find gifts to give.

Figure 6. The Ease of Determining the Best Gift with the Application

Even though the recommendation system created can make it easier for gift-givers to determine the right gift for someone, several things still need to be developed. One thing that needs to be developed is a tool to determine someone's personality. In the recommendation system created, the gift giver must answer 40 questions so that the system can find out the personality of the potential gift recipient. The number of questions can make respondents lazy, so the answers are invalid. Invalid answers can result in conclusions drawn by the recommendation system regarding the gift recipient's personality not following the gift recipient's actual personality. As a result, the recommended gift needs to satisfy the gift recipient.

4. Conclusion

Based on the results of the validation that has been done, 80% of respondents as gift-givers strongly agreed that the system developed was very helpful in determining the right gift for someone, and 73.33% of respondents as gift-recipients strongly agreed that Recommended gifts according to the desired gifts. So, the system developed helps overcome confusion and anxiety in determining the right gift for someone and reduces disappointment due to receiving gifts that are not as expected. In future research, the system will be developed by re-evaluating the variables used to assess personality indicators so that there are fewer of them and using another form of the Fuzzy membership function.

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