JURNAL RISET INFORMATIKA **P-ISSN: 2656-1743 |E-ISSN: 2656-1735**
Vol. 2, No. 4 September 2020 DOI: https://doi.org/10.34288/jri.v2i4.159

IMPLEMENTATION OF DATA MINING TO DETERMINE THE ASSOCIATION BETWEEN BODY CATEGORY FACTORS BASED ON BODY MASS INDEX

Desti Fitriati[1], Bima Putra Amiga[2]

Program Studi Teknik In*form*atika[1,2]
Universitas Pancasila[1,2]
desti.fitriati@univpancasila.ac.id[1], bimaamg@gmail.com[2]

Abstrak

Perkembangan arus globalisasi yang semakin meningkat dalam bidang ilmu pengetahuan dan teknologi serta peningkatan pendapatan telah memberikan dampak pada berkurangnya aktivitas fisik masyarakat yang mengakibatkan penyimpangan pola makan dan aktivitas fisik yang membuat seseorang tidak memperhatikan bentuk tubuhnya. Metode perhitungan Indeks Massa Tubuh ini dapat digunakan untuk menentukan bentuk tubuh seseorang. Terdapat beberapa faktor yang dapat mempengaruhi nilai Indeks Massa Tubuh diantaranya adalah faktor individu, pola konsumsi, dan kurangnya aktivitas fisik yang mengarah pada pola hidup sedentaris (sedentary lifestyle). Faktor-faktor tersebut dijadikan menjadi 69 itemset yang akan dijadikan dasar pertanyaan dalam kuesioner untuk mengumpulkan dataset yang nantinya akan diolah menggunakan algoritma FP-Growth dan dicari aturan asosiasi yang memiliki nilai support x confidence tertinggi. Dari 490 data hasil perhitungan dikategorikan menjadi 10 masing-masing adalah Laki-Laki dengan Indeks Massa Tubuh (IMT) Sangat Kurus dengan nilai support x confidence tertinggi sebesar 39,56%, Laki-Laki dengan IMT Kurus sebesar 55,90%, Laki-Laki dengan IMT Normal sebesar 70%, Laki-Laki dengan IMT Gemuk sebesar 49,23%, Laki-Laki dengan IMT Obesitas sebesar 41,34%, Perempuan dengan IMT Sangat Kurus sebesar 41,37%, Perempuan dengan IMT Kurus sebesar 37,21%, Perempuan dengan IMT Normal sebesar 68,83%, Perempuan dengan IMT Gemuk sebesar 41,65%, dan Perempuan dengan IMT Obesitas sebesar 42,91%.

Kata kunci: Algoritma FP-Growth, Data Mining, Asosiasi, Indeks Massa Tubuh, IMT

Abstract

The development of the increasing flow of globalization in the field of science and technology as well as increased income has resulted in reduced physical activity of the community which results in diverging diet and physical activity which makes a person not pay attention to his body shape. This method of calculating the Body Mass Index can be used to determine a person's body shape. Several factors can affect the value of the Body Mass Index, including individual factors, consumption patterns, and lack of physical activity which leads to a sedentary lifestyle. These factors are made into 69 itemsets which will be used as the basis for questions in the questionnaire to collect a dataset that will later be processed using the FP Growth algorithm and looking for association rules that have the highest support x confidence value. From the 490 calculation data, the results are categorized into 10, each of which is Men with a Very Thin BMI with the highest support x confidence value of 39.56%, Men with a Thin BMI of 55.90%, Men with a Normal BMI of 70%, men with a fat BMI of 49.23%, men with an obese BMI of 41.34%, women with a very thin BMI of 41.37%, women with a thin BMI of 37.21%, Normal BMI is 68.83%, women with obese BMI are 41.65%, and women with obese BMI are 42.91%.

Keywords: FP-Growth Algorithm, Data Mining, Associations, Body Mass Index, IMT

PENDAHULUAN

The development of the increasing flow of globalization in the field of science and technology as well as increasing incomes have had an impact on changes in lifestyle, behavior, and situations in the community (Ayuni, Suharso, & Sukidin, 2019). These changes have an impact on reduced physical activity (Suryadinata & Sukarno, 2019) a society which results in divergent eating patterns and physical activities that make a person not pay attention to his body shape (Rahmayanti, 2016)

Some people feel their body is fat when in fact they are not fat or vice versa (Ariati, Gumala, &

Nursanyoto, 2017). This perception arises because a person does not know how to categorize his body shape (Nahdiyah, 2015) in the right way. One way to find out a person's body shape is by calculating the Body Mass Index method.

This method of calculating the Body Mass Index can be used to determine a person's nutritional status (Kusuma & Pinandita, 2011), (Syahputra & Muhathir, 2018). The results of the calculation of the Body Mass Index can be categorized into very thin, skinny, normal, overweight, and obese body shapes. (Putra & Solichathi Rizqi, 2018). Among the Body Mass Index categories, obesity is a problem (Dewi & Mahmudiono, 2013) where people who are categorized by body shape have excess nutrition (Dewi & Mahmudiono, 2013). In public life, the term obesity is usually called overweight. This obesity phenomenon is the result of an unbalanced excessive intake of nutrients (Mahdali, 2019) by expending energy and can cause health problems (Hasanah & Febrianti, 2012). A high Body Mass Index (BMI) value is indicated by a bodyweight above the average due to the accumulation of excess fat in the body over a long period. (Jannah & Utami, 2018)

In 2016, WHO stated that the prevalence of obesity in the world has more than doubled since 1980. In 2014, more than 1.9 billion adults aged 18 years and older were overweight, and 600 million among them are obese. Some of the factors associated with high Body Mass Index include high dietary habits and lack of physical activity which leads to a sedentary lifestyle such as watching television and playing computer/video games.

This study aims to examine the relationship between the factors that influence body shape based on a person's BMI which includes individual factors, physical activity, eating habits, sedentary behavior, and stress factors at work using the FP-Growth algorithm data mining method. Also, this study provides guidelines and guidelines to determine what factors influence body shape based on BMI.

RESEARCH METHODS

Types of research

This research is a type of experimental quantitative research, where the conclusion of this study is based on the results of the calculation trial which is selected the best.

Time and Place of Research

The data collection time in this study was October 2019.

Research Target / Subject

In this study using non-physical data by distributing questionnaires that have been compiled based on the results of a literature study. Then the questionnaire was distributed to general people using Google Form. The completed questionnaires will be collected in a file with the XLS extension. Subjects were taken randomly to get various types of body categories.

Procedure

The FP-Growth algorithm uses the concept of building a tree, which is commonly called the FP-Tree, in searching for Frequent itemsets instead of generating candidates as is done in the Apriori Algorithm. By using this concept, the FP-Growth algorithm is faster than the Apriori algorithm (Anggraeni, Iha, Erawati, & Khairunnas, 2019). The following are the steps for the FP-Growth algorithm.

1. Determine the minimum support and minimum confidence.
2. Create an Fp-Tree based on the sorted itemset. Fp-Tree is formed by a root labeled Null, a group of trees whose members are certain items. Each node in the Fp-Tree contains three important information, namely the item label, informing the type of item the node represents, support count, representing the number of transaction paths that go through the node, and a pointer (Muliono, 2017).
3. Create a Conditional Pattern Base. Conditional Pattern Base is a sub-database that contains a prefix path and a pattern suffix. Generating the Conditional Pattern Base is obtained through the previously built Fp-Tree. The Conditional Pattern Base is obtained from the FP-tree.
4. Create a Conditional Fptree. At this stage, the support count of each item in each Conditional Pattern Base is added up, then each item that has a support count greater than the minimum support count will be generated with a conditional FP-tree. The conditional Fp.tree was obtained from the established fp.tree (Lestari, 2015).
5. Create a Frequent Pattern. The Frequent itemset Search Stage If the Conditional Fp-Tree is a single path, then the Frequent itemset is obtained by doing a combination of items for each conditional FP-tree. If it is not a single track, a Frequent Pattern will be generated. Frequent Patterns are obtained from the Conditional Fp-Tree
6. Create association rules. The results of the Association Rules are obtained from the conditional Frequent pattern which is entered

into the support, confidence, lift ratio formula. Lift ratio is an important parameter besides support and confidence in the association rule. The lift ratio measures how important the rule is based on the value of support and confidence. The lift ratio is a value that indicates the validity of the transaction process and provides information on whether product A has a relationship with product B. If the calculation results are looking for lift ratio> 1, then we can determine a valid rule. The results of the Association Rules are obtained from the conditional Frequent pattern. And to find out the validation of the results of the association rules, the Support, Confidence, and Lift ratio values can be calculated.

Data, Instruments, and Data Collection Techniques

The data used in this study are primary, that is, the data is taken and processed by the researcher. The data collection technique used was a randomly distributed questionnaire form, where the instrument used was the Google Form.

Data analysis technique

The results of data processing using the FP Growth algorithm by setting a minimum support value which is determined based on the upper quartile calculation of the itemset frequency of each gender and BMI, and minimum confidence of 80%. Where the minimum 80% confidence indicates the certainty that the data will appear in the item set.

RESULTS AND DISCUSSION

The results of the research are presented in graphical, tabular, or descriptive form. Analysis and interpretation of these results are required before the discussion.

Data processing

The data that will be used to predict this is obtained based on the results of the questionnaire that the respondents have filled in. The results of the questionnaire can be divided into 10 types of respondent characteristics based on gender and BMI category. The following is the distribution in Table 1 below.

Table 1. Data Grouping by Gender and BMI

No.	Gender	BMI
1	Laki- Laki	Sangat Kurus
2	Laki- Laki	Kurus
3	Laki- Laki	Normal
4	Laki- Laki	Gemuk
5	Laki- Laki	Obesitas
6	Perempuan	Sangat Kurus
7	Perempuan	Kurus
8	Perempuan	Normal
9	Perempuan	Gemuk

For the itemset used, there were 69 itemsets, among others, as shown in Table 2 below.

Table 2. List of Itemset Categories

No.	Code	*Itemset*
1	A1	Remaja
2	A2	Dewasa
3	B1	Jawa dan Bali
4	B2	Sumatra
5	B3	Kalimantan
6	B4	Papua
7	B5	Sulawesi
8	B6	Maluku
9	B7	Nusa Tenggara
10	B8	Pendatang
11	C1	Tidak Berpendidikan
12	C2	Pendidikan Terakhir SD atau yang Sederajat
13	C3	Pendidikan Terakhir SMP atau yang Sederajat
14	C4	Pendidikan Terakhir SMA atau yang Sederajat
15	C5	Pendidikan Terakhir D3
16	C6	Pendidikan Terakhir D4
17	C7	Pendidikan Terakhir S1
18	C8	Pendidikan Terakhir S2
19	C9	Pendidikan Terakhir S3
20	D1	Perokok Aktif
21	D2	Perokok Pasif
22	D3	Mantan Perokok
23	D4	Tidak Rokok
24	E1	Waktu Tidur Ideal
25	E2	Waktu Tidur Tidak Ideal
26	F1	Makan Pagi Sering
27	F2	Makan Pagi Sebagian Besar Waktu
28	F3	Makan Pagi Jarang
29	F4	Makan Pagi Tidak Pernah
30	G1	Makan Siang Sering
31	G2	Makan Siang Sebagian Besar Waktu
32	G3	Makan Siang Jarang
33	G4	Makan Siang Tidak Pernah
34	H1	Makan Malam Sering
35	H2	Makan Malam Sebagian Besar Waktu
36	H3	Makan Malam Jarang
37	H4	Makan Malam Tidak Pernah
38	I1	Konsumsi Susu Sering
39	I2	Konsumsi Susu Sebagian Besar Waktu
40	I3	Konsumsi Susu Jarang
41	I4	Konsumsi Susu Tidak Pernah
42	J1	Konsumsi Buah Sering
43	J2	Konsumsi Buah Sebagian Besar Waktu
44	J3	Konsumsi Buah Jarang

No.	Code	*Itemset*
45	J4	Konsumsi Buah Tidak Pernah
46	K1	Konsumsi Fast Food Sering
47	K2	Konsumsi Fast Food Sebagian Besar Waktu
48	K3	Konsumsi Fast Food Jarang
49	K4	Konsumsi Fas Food Tidak Pernah
50	L1	Konsumsi Makanan Kecil Sering
51	L2	Konsumsi Makanan Kecil Sebagian Besar Waktu
52	L3	Konsumsi Makanan Kecil Jarang
53	L4	Konsumsi Makanan Kecil Tidak Pernah
54	M1	Konsumsi Minuman Berasa Sering
55	M2	Konsumsi Minuman Berasa Sebagian Besar Waktu
56	M3	Konsumsi Minuman Berasa Jarang
57	M4	Konsumsi Minuman Berasa Tidak Pernah
58	N1	Konsumsi Soft Drink Sering
59	N2	Konsumsi Soft Drink Sebagian Besar Waktu
60	N3	Konsumsi Soft Drink Jarang
61	N4	Konsumsi Soft Drink Tidak Pernah
62	O1	Sedentary Behavior Rendah
63	O2	Sedentary Behavior Tinggi
64	P1	Aktivitas Fisik Ringan
65	P2	Aktivitas Fisik Kuat
66	P3	Aktivitas Fisik Sedang
67	Q1	Stress Ringan
68	Q2	Stress Sedang
69	Q3	Stress Berat

System Design

The architecture of this system contains four kinds of data which can be seen in Figure 1, namely Login, category management, management dataset, and calculation of FP Growth. This login process is only done by the admin. Admin is required to log in before entering the system. The admin in this system is only one condition and cannot be added so that it does not require user management.

There are two data management systems for this system, namely the management data category and the management dataset. Categorical data that contains factors that affect the value of the Body Mass Index. While the dataset contains data from the distribution of questionnaires filled out by respondents.

Finally, the calculation of FP Growth, which contains the process of calculating FP-Growth from the tb_relation data, which contains data from the results of the respondent's questionnaire and is related to tb_data and tb_category. The calculation of FP-Growth is carried out to see the results of the association between the factors that affect the Body Mass Index value.

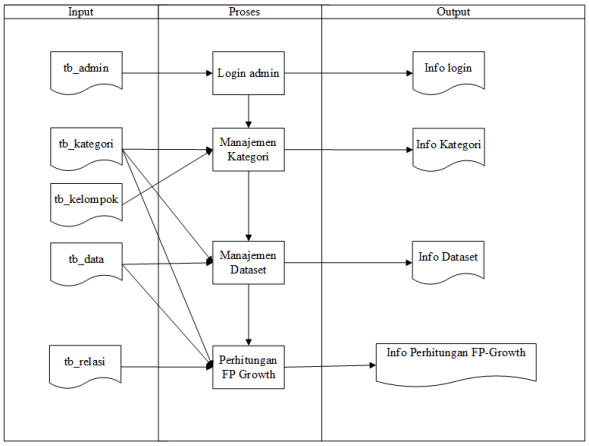

Figure 1. Software Architecture

The following is a snippet of the FP-Growth program:

```
<?php
class Fpg extends CI_Controller {
public function __construct()
{
parent::__construct();

if(!$this->session
>userdata('login'))
redirect('user/login');

$this->load->model('data_model');
$this->load
>model('kategori_model');
$this->load->helper('fpgrowth');
$this->load->model('relasi_model');
}

public function index() {
$data['title'] = 'Perhitungan FP-
Growth';
$this->form_validation->set_rules(
'min_support', 'Minimal Support', 'required'
);
$this->form_validation->set_rules(
'min_confidence', 'Minimal Confidence',
'required' );

if ($this->form_validation->run()=== FALSE)
{
   load_view('fpg', $data);
}
else
{
$data['data'] = $this->relasi_model >
get_relasi_filter($this->input->post('jk'),
$this->input->post('imt'));
$data['kategori'] = $this->kategori_model-
>tampil();

$this->load->view('header', $data);
$this->load->view('fpg');
$this->load->view('fpg_hasil');
$this->load->view('footer');
}
}
}
```

P-ISSN: 2656-1743 |E-ISSN: 2656-1735
DOI: https://doi.org/10.34288/jri.v2i4.159

Implementation Program

1. FP-Growth Calculation page

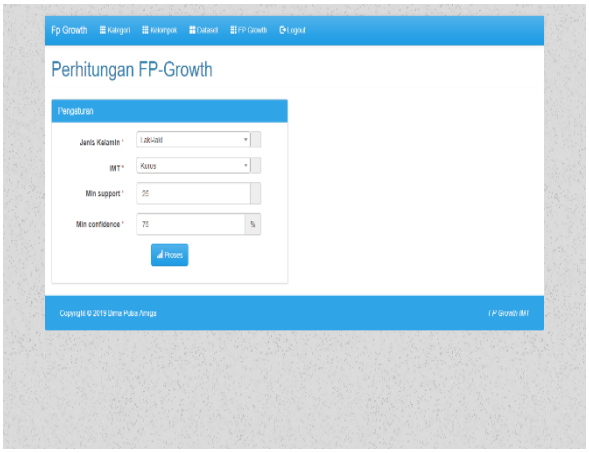

Figure 2. FP-Growth Calculation Page Interface

Figure 2 is the initial entry before calculating the FP Growth according to the selected category, where the entries include setting Gender, BMI Category, the minimum value of support, and minimum confidence. In this study, we will look for the associated value of the factors that affect the value of BMI based on gender and BMI category.

2. The interface of FP-Growth for Ordered Itemset Stage

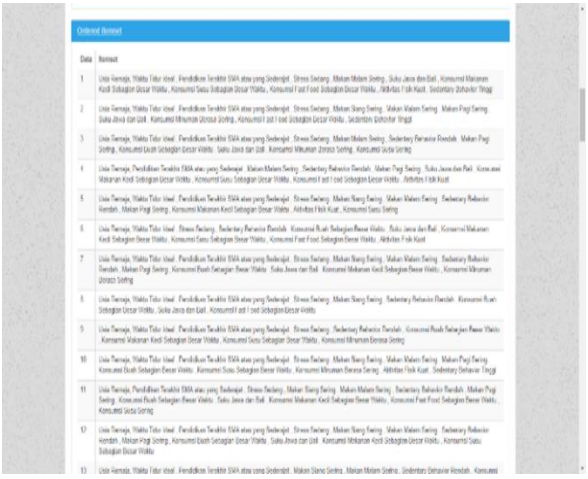

Figure 3 Detailed Interface Implementation

After making the initial settings, then the item combination process is carried out as seen in Figure 3 above.

3. FP-Growth Calculation Interface for Conditional FP-Tree Stage

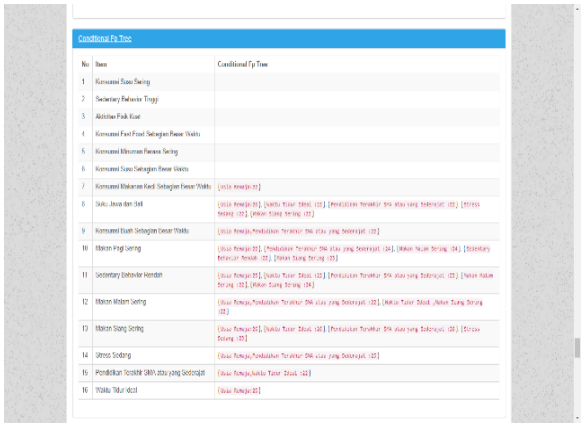

Figure 4 FP-Growth Calculation Interface for Conditional FP-Tree Stage

After obtaining an ordered itemset, the next step is to calculate the conditional pattern base and conditional FP-Tree to get the rules as shown in Figure 4.

4. FP-Growth Calculation Interface Frequency Pattern Stage

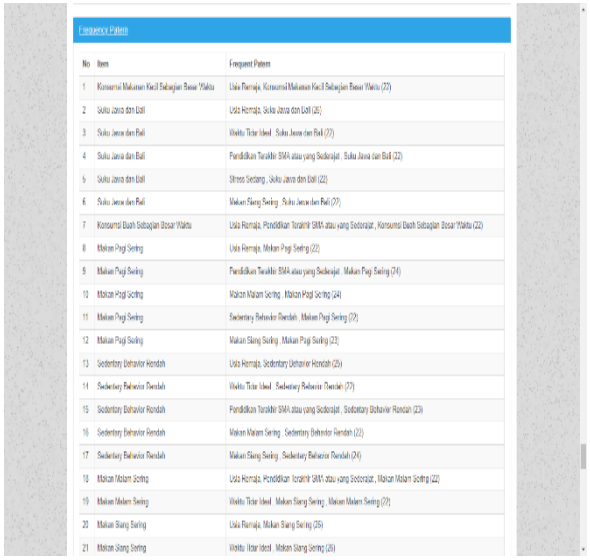

Figure 5 Formation Interface for FP-Growth Stage Frequency Pattern

After getting the rules, then this algorithm starts making Frequency Patterns. Where at this stage you will see several itemsets that are always close together and the number of occurrences is calculated simultaneously. The frequency pattern stage can be seen in Figure 5 above.

5. FP-Growth Calculation Interface Association Rules Stage

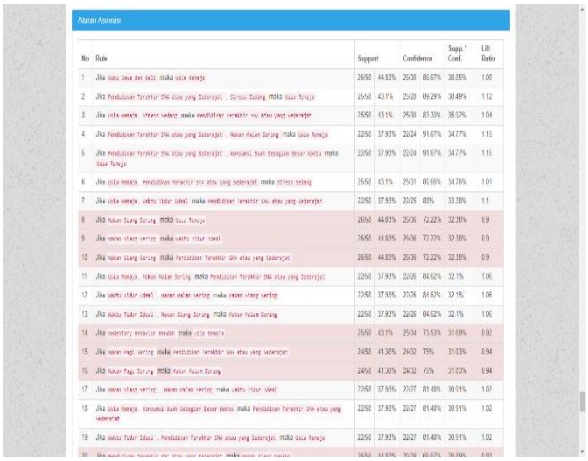

Figure 6 The interface of FP-Growth Calculation of Association Rules Stage

The last step to take is to find association rules that match the predetermined minimum support and minimum confidence. The results of the final association are taken for itemset that has a lift ratio value of more than 1. Figure 6 shows the results of the rules taken, where the itemset that is blocked or colored orange are itemsets that do not meet the requirements.

Results Analysis

Based on the test results by setting a minimum confidence value of 80%, the following results were obtained:

1. The results of system testing for the male sex group with a very thin BMI category with a minimum support value of 16, the highest support x confidence results are 39.56% in the association rule "If you eat dinner often then ideal sleep time".
2. the results of the system test for the male sex group with the thin BMI category with a minimum support value of 20, the highest support x confidence results are 55.90% in the association rules "If the last education is a high school or equivalent, then the adolescent age"
3. the results of system testing for the male sex group with the Normal BMI category with a minimum support value of 20, the results obtained support x confidence of 70% in the association rules "If the Age is Adolescent then the Last Education is High School or the Equivalent"
4. the results of the system test for the male sex group with the Fat BMI category with a minimum support value of 22, the highest support x confidence results are 49.23% on the association rule "If lunch is frequent, then adult age"
5. the results of system testing for the male sex group with the category of BMI Obesity with a minimum support value of 23, the highest support x confidence results are 41.34% in the association rules "If you are a teenager then the last education is high school or equivalent"
6. The results of system testing for the female sex group in the Very Thin BMI category with a minimum support value of 17, the highest support x confidence results are 41.37% in the association rule "If Sedentary Behavior is High, then Stress is Moderate"
7. The results of system testing for the female sex group with the Normal BMI category with a minimum support value of 19, the highest support x confidence results are 37.21% in the association rule "If you consume milk most of the time then moderate stress"
8. the results of the system testing for the female sex group with the thin BMI category with a minimum support value of 20, the highest support x confidence results are 68.83% in the association rules "If the last education is a high school or equivalent, then the teenage age"
9. the results of system testing for the female sex group with the Fat BMI category with a minimum support value of 22, the highest support x confidence results are 41.65% in the association rules "If you are an adult then don't smoke"
10. The results of system testing in the female sex group with the BMI category of Obesity with a minimum support value of 24 obtained the highest support x confidence results of 42.91% in the association rule "If it is ideal sleep time then the adult age"

CONCLUSIONS AND SUGGESTIONS

Conclusion

From the 490 calculation data, the results are categorized into 10, each of which is Men with a Very Thin BMI with the highest support x confidence value of 39.56%, Men with a Thin BMI of 55.90%, Men with a Normal BMI of 70%, men with a fat BMI of 49.23%, men with an obese BMI of 41.34%, women with a very thin BMI of 41.37%, women with a thin BMI of 37.21%, Normal BMI is 68.83%, women with obese BMI are 41.65%, and women with obese BMI are 42.91%.

Suggestion

It is necessary to distribute questionnaires more widely to add more data to obtain the results of the association rules which have a higher support x confidence value in each grouping based on the Gender and Body Mass Index Category.

REFERENCE

Anggraeni, S., Iha, M. A., Erawati, W., & Khairunnas, S. (2019). Analysis of Sales by Using Apriori and FP-Growth at PT. Panca Putra Solusindo. *Riset Dan E-Jurnal Manajemen Informatika Komputer*, *3*(2), 41–46. Retrieved from https://jurnal.polgan.ac.id/index.php/remik/article/view/10107

Ariati, N. N., Gumala, N. M. Y., & Nursanyoto, H. (2017). HUBUNGAN KONSUMSI MAKRONUTRIEN DENGAN RESIKO PENUAAN DINI PADA LANSIA YANG MENGIKUTI SENAM LANSIA DI POSYANDU KABUPATEN GANYAR. *Jurnal Sangkareang Mataram*, *3*(3), 34–37. Retrieved from http://untb.ac.id/wp-content/uploads/2017/06/8.HUBUNGAN-KONSUMSI-MAKRONUTRIEN-DENGAN-RESIKO-PENUAAN-DINI-PADA-LANSIA-Nengah-Ariati.pdf

Ayuni, A., Suharso, P., & Sukidin, S. (2019). PERUBAHAN GAYA HIDUP MAHASISWI UNIVERSITAS ABDURACHMAN SALEH KOTA SITUBONDO (STUDI KASUS: PERILAKU KONSUMTIF MAHASISWI FAKULTAS EKONOMI JURUSAN MANAJEMEN ANGKATAN 2014 DALAM MENGGUNAKAN KOSMETIK BRANDED). *JURNAL PENDIDIKAN EKONOMI: Jurnal Ilmiah Ilmu Pendidikan, Ilmu Ekonomi Dan Ilmu Sosial*, *13*(1), 58–65. https://doi.org/10.19184/jpe.v13i1.10421

Dewi, A., & Mahmudiono, T. (2013). Hubungan Pola Makan, Aktivitas Fisik, Sikap, dan Pengetahuan Tentang Obesitas dengan Status Gizi Pegawai Negeri Sipil di Kantor Dinas Kesehatan Provinsi Jawa Timur. *Jurnal Media Gizi Indonesia*, *9*(1), 42–48.

Hasanah, D. N., & Febrianti, M. (2012). KEBIASAAN MAKAN MENJADI SALAH SATU PENYEBAB KEKURANGAN ENERGI KRONIS (KEK) PADA IBU HAMIL DI POLI KEBIDANAN RSI&A LESTARI CIRENDEU TANGERANG SELATAN. *Jurnal Kesehatan Reproduksi*, *3*(3), 91–104. Retrieved from https://media.neliti.com/media/publications/106703-ID-kebiasaan-makan-menjadi-salah-satu-penye.pdf

Jannah, M., & Utami, T. N. (2018). Faktor yang Memengaruhi Terjadinya Obesitas Pada Anak Sekolah di SDN 1 Sigli Kabupaten Pidie. *Jurnal Kesehatan Global*, *1*(3), 110–118. https://doi.org/10.33085/jkg.v1i3.3928

Kusuma, B. J., & Pinandita, T. (2011). Rancang Bangun Aplikasi Mobile Perhitungan Indeks Massa Tubuh dan Berat Badan Ideal. *Juita*, *I*(4), 157–168. Retrieved from https://www.neliti.com/publications/92701/rancang-bangun-aplikasi-mobile-perhitungan-indeks-massa-tubuh-dan-berat-badan-id

Lestari, Y. D. (2015). Penerapan Data Mining Menggunakan Algoritma Fp-Tree Dan Fp-Growth Pada Data Transaksi Penjualan Obat. *Seminar Nasional Teknologi Informasi Dan Komunikasi (SNASTIKOM 2015)*, 60–65. https://doi.org/10.31227/osf.io/t93uv

Mahdali, I. (2019). NUTRITIONAL EDUCATION EFFECTS ON KNOWLEDGE CHANGE, ATTITUDE AND CHANGES IN CONSUMPTION PATTERNS AND OBESITY SEDENTARY ADOLESCENT ACTIVITIES. *Universitas Negeri Gorontalo*, *1*(1), 33–46. Retrieved from http://ejurnal.ung.ac.id/index.php/jjsc/article/view/2011

Muliono, R. (2017). Analisis Efisiensi Algoritma Data Mining. *Semantika (Seminar Nasional Teknik Informatika)*, *1*(1), 978–602. Retrieved from http://fimi.ua.ac.be/data/.[12]

Nahdiyah, I. (2015). *Hubungan antara body image dengan kepuasan hidup pada remaja yang mengalami obesitas di Komunitas KAGUMI (Ikatan Wanita Gemuk Indonesia)* (Universitas Islam Negeri Maulana Malik Ibrahim Malang). Universitas Islam Negeri Maulana Malik Ibrahim Malang. Retrieved from http://etheses.uin-malang.ac.id/1531/

Putra, Y. W., & Solichathi Rizqi, A. (2018). INDEX MASSA TUBUH (IMT) MEMPENGARUHI AKTIVITAS REMAJA PUTRI SMP NEGERI 1 SUMBERLAWANG. *Gaster | Jurnal Ilmu Kesehatan*, *16*(1), 105–115. https://doi.org/10.30787/gaster.v16i1.233

Rahmayanti, D. (2016). Pola Makan Anak Dengan Status Gizi Anak Usia 6-8 Tahun Di SD Wilayah Kelurahan Cempaka. *Dunia Keperawatan*, *4*(1), 8–13. Retrieved from https://ppjp.ulm.ac.id/journal/index.php/JDK/article/view/2504/

Suryadinata, R. V., & Sukarno, D. A. (2019).

PENGARUH AKTIVITAS FISIK TERHADAP RISIKO OBESITAS PADA USIA DEWASA. In *The Indonesian Journal of Public Health* (Vol. 14). https://doi.org/10.20473/IJPH.V14I1.2019.104-114

Syahputra, D., & Muhathir, M. (2018). Perhitungan Metode Fuzzy Sugeno Dan Antropometri Dalam Memprediksi Status Gizi Indeks Massa Tubuh. *JOURNAL OF INFORMATICS AND TELECOMMUNICATION ENGINEERING*, *2*(1), 16. https://doi.org/10.31289/jite.v2i1.1676