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THE INFLUENCE OF MAJOR EXPERTISE COURSES ON ALUMNI EMPLOYMENT USING THE APRIORI METHOD

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Abstract. The role of alumni in university progress and quality is vital. This study used data from the tracer study application to analyze the relationship between skill courses and alumni employment. The data mining technique of association was employed to find linkages between different parameters. The Apriori algorithm was used to identify patterns that described the relationship between skill courses and alumni employment. The findings revealed that the most sought-after professions by the Informatics Engineering Study Program alumni were educators, such as teachers and lecturers, with a support value of 18.7692%. Programmers were also in high demand, with a support value of 15.3846%. Databases, Computer Networks, Computer Human Interaction, and Software Engineering were the subjects that had the most significant influence on employment. These findings provide valuable insights for the Informatics Engineering Study Program to prioritize and enhance these influential courses in curriculum, teaching methods, and teaching materials to improve the relevancy and quality of the courses in supporting alumni employment.

Keywords: Apriori, Data Mining, Tracer Study

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INTRODUCTION

The relationship between learning experiences and postgraduate outcomes, including employment rates, continuing education, and starting salary. For example, high-impact learning experiences such as internships, capstones, and service-learning positively correlate with graduation job attainment [1]. Work placements, cooperative education, and internships have also led to better degrees and contributed to easier routes to graduate jobs [2]. Service-learning experiences have also significantly influenced alumni postgraduate employment [3]. Career courses have been cited as having numerous benefits, including increased career decidedness, maturity, positive career behaviors, internal locus of control, vocational identity, college retention and graduation rates, and career decision-making skills, among other variables [4]. Research indicates that the courses students excel in significantly affect their career choices. For instance, graduates with higher GPAs tend to secure jobs more quickly and at higher salaries [5], [6]. Collaborations with employers have also positively impacted graduates' employability prospects [7] [8].

The relationship between significant expertise courses and alumni employment can be effectively analyzed using the Apriori algorithm, a popular data mining technique for discovering association rules. This method can help identify patterns and correlations between the courses taken by graduates and their subsequent employment outcomes [9]. Researchers can uncover specific associations between course selections and employment outcomes by applying the Apriori algorithm. For example, a study found that graduates who took specific elective courses were likelier to find employment within six months post-graduation [10].

Alumni data obtained through tracer studies are the primary material used to monitor and evaluate the study program, especially in the applied curriculum. The alignment of the curriculum with the needs of the world of work is a crucial reference [11]. From this data, it can be analyzed whether a university has produced quality alumni and the feedback provided [12]. The absorption of alumni in the industrial world is one of the determinants of the campus success rate in carrying out education and achieving alumni outcome targets. Conducting tracer studies surveys that track graduates' career paths combined with the Apriori algorithm can reveal insights into job placement success rates based on academic performance and course selection. These studies often highlight that while a high GPA correlates with quicker employment, it does not always guarantee job offers at higher salary levels [6], [13].

Universitas Islam Negeri Sultan Syarif Kasim Riau currently has thousands of alumni. Since its establishment in 1970, UIN Suska Riau has continued to experience development, especially in the number of alumni who are widely scattered and take part at the national and international levels. However, the problem is that the distribution data of these alumni has not been managed. The interview results with Mr. Iwan Iskandar, MT, Head of the Informatics Engineering Department, stated that the management of tracer study data for alumni has not been carried out correctly. Tracer studies are only carried out in each study program when going through the accreditation process. The management and distribution of alumni should be well-managed and consistent periodically.

METHODS

A. DATA MINING

Data mining is analyzing large amounts of data to produce useful information. The main goal of data mining is to gain new knowledge implied in the existing database. This knowledge results from extraction using statistics, artificial intelligence, and machine learning [14].
Data Mining consists of 5 types of methods, such as [15]:

1. Classification, generating classes from adjacent parameter characters. Data labels are pre-made for processing.
2. Estimation, estimating unknown values.
3. Prediction, estimating future values that have not yet occurred.
4. Clustering, grouping data based on similar characteristics.
5. Association finding patterns from multiple items to gain new information or knowledge.

B. APRIORI ALGORITHM

A priori algorithm is an algorithm that makes rules for the relationship of several parameters or attributes. Here are the stages of the a priori algorithm:

1. Determining the Value of Minimum Support (MS)
2. Perform repetitions
    a. Repetition 1: count the items of support. Here's the formula used for the calculation of each item: [16]:

$$\boldsymbol{Support\ (X)} = \frac{\boldsymbol{Number\ of\ transactions\ X}}{\boldsymbol{Total\ Transactions}} \quad (1)$$

If the initial item is obtained, it is determined whether it is above MS.
If it has met the MS value, the 1-item set will be a persistent pattern.

    b. Repetition 2: Then, to get a 2-item set, a combination of the previous k-itemset is performed, after which the items that contain support are counted. The support value of 2 items is obtained using the following formula [16]:

$$\underline{\boldsymbol{Support(x,y) = P(x \cap y)}}$$

$$\boldsymbol{Support(x,y)} = \frac{\boldsymbol{\sum Transactions\ contain\ x\ dan\ y}}{\boldsymbol{\sum Transactions}} \quad (2)$$

Next, the item that satisfies the MS will be selected as the candidate's most *frequent* pattern.
If all high-frequency patterns have been found, look for a form of association rule that meets the minimum requirements for *confidence*. Here's the formula for *confidence values* [16]:

$$\boldsymbol{Confidence\ P(x|y)} = \frac{\boldsymbol{\sum Transactions\ contain(x)\ dan\ (y)}}{\boldsymbol{\sum Transactions\ (x)}} \quad (3)$$

Stages of Research
The following are the stages of research to be carried out:

1. **Identify the Problem**

Analyze existing problems in determining the influence of study program expertise courses with jobs obtained by alumni.

2. **Literature Study**
   A literature study is used to obtain books/references related to priori algorithms, which will later be applied to this study.
3. **Data Collection**
   Data were obtained from interviews with the Head of the Informatics Engineering Study Program, data on the results of tracer studies from alumni who had graduated 2 years earlier, Study Program Expertise Courses, and types of work by alumni
4. **Analysis and Planning**
   Create a flowchart by analyzing each data obtained, then apply it to a priori algorithms for each data from several existing itemsets. Then, the system design stage is carried out in the form of database design and system display.
5. **Implementation and Testing**
   Carried out by the results of Analysis and Design that has been done before. After that, data in association patterns will be tested to obtain *support*, *confidence,* and *lift ratio* values.
6. **Conclusion and Advice**
   From the results of the research that has been carried out, conclusions from this study and suggestions on research shortcomings are taken.

Data Collection Techniques

The initial stage of this research is to collect data collected from https://alumni.tif.uin-suska.ac.id/. The filling is done online and is distributed to every alumni and stakeholder. The alumni recorded are alumni who graduated in the 2019-2021 time frame. The data filled in by alumni include NIM, Name, Gender, Place of Birth, College Entrance Year, GPA, Work waiting period, Work Agency, Work Sector, Field of Work, Most Supportive Courses, and Obstacles. After the data is obtained, it is then processed using stages in Knowledge Discovery in Database (KDD), namely KDD, *feature selection, data preprocessing, data transformation, data mining, interpretation, and evaluation*.

RESULT AND DISCUSSION

The data from filling out questionnaires for alumni who graduated from 2019-2021 amounted to 356. Here's Figure 1. Data on the results of filling out the questionnaire:

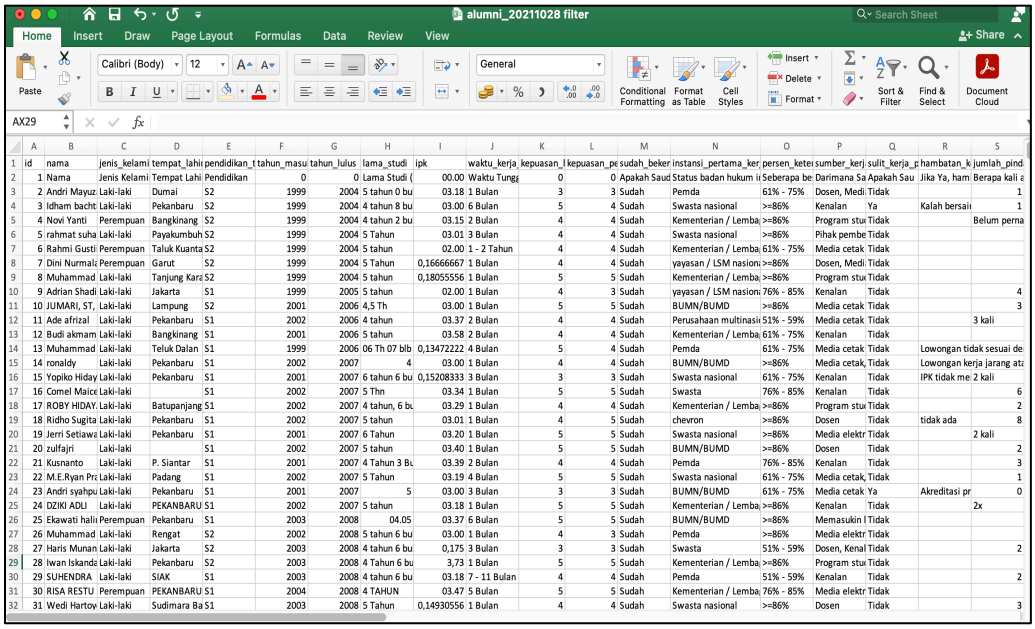

Figure 1. Data on the results of filling out the questionnaire

After the data is taken, the KDD process is then carried out, which consists of several stages, namely:

1) Feature Selection

The parameters or variables to be used in research are determined at this stage. This study focuses on variable types/fields of work with supporting courses. These variables are taken based on research topics that aim to find the relationship between the type of work and the courses supporting references for the job.

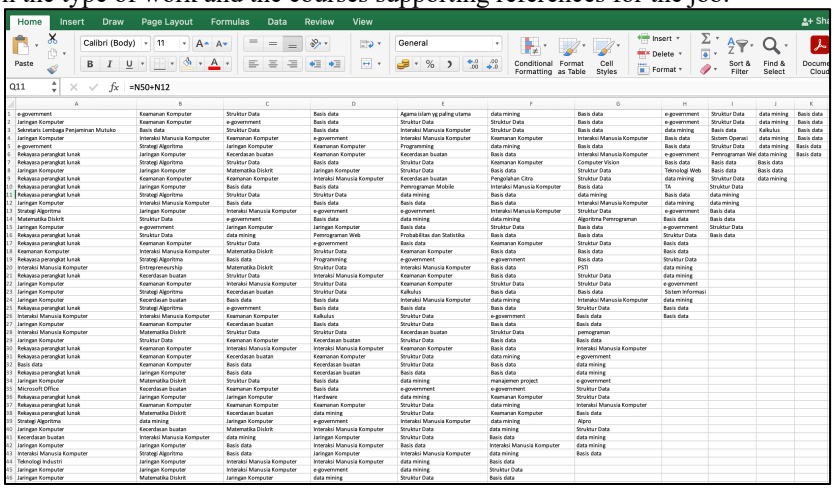

Figure 2. Feature Selection Results

2) Preprocessing data

Data checks are carried out at this stage, such as checking blank data (missing value), inconsistent data, and outliers of the total data obtained, namely 356 data after the preprocessing stage became as many as 325 data. This is because some empty data and data do not match the filling (inconsistent). Here's Figure 3—results of the data preprocessing stage for the Job Support Course.

1	e-government	Keamanan Komputer	Struktur Data	Basis data	Agama islam yg paling utama	data mining
2	Jaringan Komputer	Keamanan Komputer	e-government	Basis data	Struktur Data	Struktur Data
3	Sekretaris Lembaga Penjaminan Mutuko	Basis data	Struktur Data	Basis data	Interaksi Manusia Komputer	Struktur Data
4	Jaringan Komputer	Interaksi Manusia Komputer	Keamanan Komputer	e-government	Interaksi Manusia Komputer	Keamanan Komputer
5	e-government	Strategi Algoritma	Jaringan Komputer	Keamanan Komputer	Programming	data mining
6	Rekayasa perangkat lunak	Jaringan Komputer	Kecerdasan buatan	Keamanan Komputer	Kecerdasan buatan	Basis data
7	Rekayasa perangkat lunak	Strategi Algoritma	Struktur Data	Basis data	Struktur Data	Keamanan Komputer
8	Jaringan Komputer	Jaringan Komputer	Matematika Diskrit	Jaringan Komputer	Struktur Data	Basis data
9	Rekayasa perangkat lunak	Keamanan Komputer	Keamanan Komputer	Interaksi Manusia Komputer	Kecerdasan buatan	Pengolahan Citra
10	Rekayasa perangkat lunak	Jaringan Komputer	Basis data	Basis data	Pemrograman Mobile	Interaksi Manusia Komputer
11	Rekayasa perangkat lunak	Strategi Algoritma	Struktur Data	Struktur Data	data mining	Basis data
12	Jaringan Komputer	Interaksi Manusia Komputer	Basis data	Basis data	Basis data	Basis data
13	Strategi Algoritma	Jaringan Komputer	Interaksi Manusia Komputer	e-government	e-government	Interaksi Manusia Komputer
14	Matematika Diskrit	Struktur Data	e-government	Basis data	data mining	data mining
15	Jaringan Komputer	e-government	Jaringan Komputer	Jaringan Komputer	Basis data	Struktur Data
16	Rekayasa perangkat lunak	Struktur Data	data mining	Pemrograman Web	Probabilitas dan Statistika	Basis data
17	Rekayasa perangkat lunak	Keamanan Komputer	Struktur Data	e-government	Basis data	Keamanan Komputer
18	Keamanan Komputer	Interaksi Manusia Komputer	Matematika Diskrit	Struktur Data	Keamanan Komputer	Basis data
19	Rekayasa perangkat lunak	Strategi Algoritma	Basis data	Programming	e-government	e-government
20	Interaksi Manusia Komputer	Entrepreneurship	Matematika Diskrit	Struktur Data	Interaksi Manusia Komputer	Basis data
21	Rekayasa perangkat lunak	Kecerdasan buatan	Struktur Data	Interaksi Manusia Komputer	Keamanan Komputer	Basis data
22	Jaringan Komputer	Keamanan Komputer	Interaksi Manusia Komputer	Struktur Data	Keamanan Komputer	Struktur Data
23	Jaringan Komputer	Strategi Algoritma	Kecerdasan buatan	Struktur Data	Kalkulus	Basis data
24	Jaringan Komputer	Kecerdasan buatan	Basis data	Basis data	Interaksi Manusia Komputer	data mining
25	Rekayasa perangkat lunak	Strategi Algoritma	e-government	Basis data	Basis data	Basis data
26	Interaksi Manusia Komputer	Interaksi Manusia Komputer	Keamanan Komputer	Kalkulus	Struktur Data	e-government
27	Jaringan Komputer	Keamanan Komputer	Kecerdasan buatan	Basis data	Struktur Data	Basis data
28	Interaksi Manusia Komputer	Matematika Diskrit	Struktur Data	Struktur Data	Kecerdasan buatan	Struktur Data
29	Jaringan Komputer	Struktur Data	Keamanan Komputer	Kecerdasan buatan	Struktur Data	Basis data
30	Rekayasa perangkat lunak	Keamanan Komputer	Interaksi Manusia Komputer	Interaksi Manusia Komputer	Keamanan Komputer	Basis data
31	Rekayasa perangkat lunak	Keamanan Komputer	Kecerdasan buatan	Keamanan Komputer	Struktur Data	data mining
32	Basis data	Keamanan Komputer	Basis data	Kecerdasan buatan	Struktur Data	Basis data
33	Rekayasa perangkat lunak	Jaringan Komputer	Basis data	Kecerdasan buatan	Basis data	Basis data
34	Jaringan Komputer	Matematika Diskrit	Struktur Data	Basis data	data mining	manajemen project
35	Microsoft Office	Kecerdasan buatan	Keamanan Komputer	Basis data	e-government	e-government
36	Rekayasa perangkat lunak	Jaringan Komputer	Jaringan Komputer	Hardware	data mining	Keamanan Komputer
37	Rekayasa perangkat lunak	Keamanan Komputer	Keamanan Komputer	Keamanan Komputer	Struktur Data	data mining
38	Rekayasa perangkat lunak	Matematika Diskrit	Kecerdasan buatan	data mining	Struktur Data	Keamanan Komputer
39	Strategi Algoritma	data mining	Jaringan Komputer	e-government	Interaksi Manusia Komputer	data mining
40	Jaringan Komputer	Kecerdasan buatan	Matematika Diskrit	Interaksi Manusia Komputer	Struktur Data	data mining
41	Kecerdasan buatan	Interaksi Manusia Komputer	data mining	Jaringan Komputer	Struktur Data	Basis data
42	Jaringan Komputer	Jaringan Komputer	Basis data	Interaksi Manusia Komputer	Basis data	Interaksi Manusia Komputer
43	Interaksi Manusia Komputer	Strategi Algoritma	Basis data	Jaringan Komputer	Interaksi Manusia Komputer	data mining
44	Teknologi Industri	Jaringan Komputer	Interaksi Manusia Komputer	Interaksi Manusia Komputer	data mining	Basis data
45	Jaringan Komputer	Jaringan Komputer	Interaksi Manusia Komputer	e-government	data mining	Struktur Data
46	Jaringan Komputer	Matematika Diskrit	Jaringan Komputer	data mining	Struktur Data	Basis data

Figure 3. Results of the preprocessing stage of data for MK

The following is also done during the preprocessing of the job data. Here's Figure 4. Preprocessing Results for work

	A	B	C	D	E	F	G
1	Adm. IT - Data Analyst		Adm. IT - Data Analyst	1		Adm. IT - Data Analyst	1
2	admin busdev		admin busdev	1		ADMINISTRASI	7
3	Admin bussiness development		Admin bussiness development	1		Akunting	1
4	Admin keuangan		Admin keuangan	1		Analis Keimigrasian	1
5	Admin Service		Admin Service	1		Auditor	1
6	ADMINISTRASI		ADMINISTRASI	1		Bag. Umum	1
7	Administrasi Rumah Sakit		Administrasi Rumah Sakit	1		Bagian Keuangan dan Pelaporan	1
8	Administrator		Administrator	1		Bankir	2
9	Administrator		Akunting	1		Belum Bekerja	4
10	Akunting		Analis Data	1		Bertani	1
11	Analis Data		Analis Keimigrasian	3		Creativity	1
12	Analis Keimigrasian		Auditor	1		Customer development	1
13	Analis Keimigrasian		Bag. Umum	1		Data analyst	2
14	Analis keimigrasian		Bagian Keuangan dan Pelaporan	1		Data Engineer	1
15	Auditor		Banker	1		Data management	1
16	Bag. Umum		Bankir	1		Data Warehouse Administrator	1
17	Bagian Keuangan dan Pelaporan		Belum Bekerja	1		Database Administrator	9
18	Banker		belum mendapatkan pekerjaan	1		Desainer Grafis dan Food	1
19	Bankir		Bertani	1		Diatributor Alat Transportasi	1
20	Belum Bekerja		Creativity	1		Digital marketer	2
21	belum mendapatkan pekerjaan		Customer development	1		Dosen / Pendidik / Guru	61
22	Bertani		Data analyst	1		Engineer transmisi XL	1
23	Creativity		Data Engineer	2		Enterpreneur	1
24	Customer development		Data management	1		Executive Technical Support	1
25	Data analyst		Data Warehouse Administrator	1		Fungsional Perencana	1
26	Data Engineer		Database Administrator	9		Hampir semua sektor bidang teknologi Informasi	1
27	Data Engineer		Desainer Grafis dan Food	1		Hardware dan Networking	1
28	Data management		Diatributor Alat Transportasi	1		Human Resources	4
29	Data Warehouse Administrator		Digital marketer	1		Industri Kreatif	1
30	Database Administrator		Digital Marketing Strategy	1		Internet marketer	1
31	Database Administrator		Dosen / Pendidik / Guru	42		IT Coordinator	1
32	Database Administrator		Dosen / Pendidik/ Guru	19		IT Officer	1

Figure 4. Results of the data preprocessing stage for the work

Furthermore, a calculation is made on the number of courses that appear against this type of work. This is to see the relationship between the two variables. Here's Figure 5. ResultsCalculationsions for Supporting Courses

1	Agama islam yg paling utama	1
2	Algoritma Pemrograman	2
3	Basis data	167
4	Computer Vision	1
5	Daspro	1
6	data mining	70
7	E- commerce	4
8	e-government	40
9	Entrepreneurship	1
10	Hardware	1
11	Interaksi Manusia Komputer	141
12	Jaringan Komputer	155
13	Kalkulus	3
14	Keamanan Komputer	109
15	Kecerdasan buatan	60
16	kesehatan	1
17	manajemen project	1
18	Matematika Diskrit	36
19	pemograman	1
20	Pemrograman mobile	2
21	Pemrograman web	5
22	Pengantar Teknologi Informasi	1
23	Pengembangan Aplikasi Mobile	1
24	Pengolahan Citra	1
25	Probabilitas dan Statistika	1
26	Programming	2
27	psikologi	1
28	PSTI	1
29	Rancangan Aplikasi	1
30	Sistem Informasi	1
31	Sistem Operasi	1

Figure 5. Calculationsalculations for Supporting Courses

3) Transformation Data

The next stage after Preprocessing is carried out, namely transforming data by changing the form of data to be processed into a value. Here's Table 1. Explaining data transformation for Courses

Table 1. Course Transformation

Kode	Pekerjaan
A1	Adm. IT - Data Analyst
A2	ADMINISTRASI
A3	Akunting
A4	Analis Keimigrasian
A5	Auditor
A6	Bag. Umum
A7	Bagian Keuangan dan Pelaporan
A8	Bankir
A9	Staf IT
A10	Bertani
A11	Creativity
A12	Customer development
A13	Data analyst
A14	Data Engineer
A15	Data management
A16	Data Warehouse Administrator
A17	Database Administrator
A18	Desainer Grafis dan Food
A19	Diatributor Alat Transportasi
A20	Digital marketer
A21	Dosen / Pendidik / Guru
A22	Engineer transmisi XL
A23	Enterpreneur
A24	Executive Technical Support
A25	Fungsional Perencana
A26	Hampir semua sektor bidang teknologi Informasi
A27	Hardware dan Networking
A28	Human Resources
A29	Industri Kreatif
A30	Internet marketer
A31	IT Coordinator
A32	IT Officer
A33	IT Support
A34	Junior Mobile App Developer
A35	Jurnalis Kehumasan Diskominfo
A36	Karyawan
A37	Keuangan pemerintah
A38	Logistik
A39	Manager Operasional
A40	Manajemen Strategis, SDM, Pengembangan Organisasi, TI
A41	Marketing
A42	Migas

Kode	Pekerjaan
A43	Multimedia Designer
A44	Network Administrator
A45	Network enginer
A46	Office Administrator
A47	Onlineshop
A48	Operator IT
A49	Pedagang
A50	Pegawai Negeri Sipil
A51	Pelayan public
A52	Pemasaran
A53	Penata Madya TI (IT Support, Programming dan Network Administrator)
A54	Pendukung Transaksi Kas
A55	Pengelola Unit
A56	Perbankan
A57	Personalia Generral Affairs
A58	Pranata komputer
A59	Programmer
A60	Project Admin
A61	QA Engineer
A62	Relation officer
A63	Research & development / peneliti/ laboran/ QC/ QA
A64	Retail
A65	Safety Supervisor at Oil And Gas
A66	Sales & Marketing
A67	Server Administrator
A68	Social media manager
A69	Software Developer
A70	Software Engineer
A71	Software Tester
A72	Staf Pendataan Pendidikan
A73	Staff
A74	Staff Administrasi
A75	System Analyst
A76	Technical support 24
A77	Technical Writer
A78	TEKNISI
A79	Tenaga Ahli IT
A80	Tenaga sosial kecamatan
A81	Usaha pribadi
A82	UX Design
A83	Warehouse staff
A84	Wirausaha

Next, a transformation was carried out for the types of courses previously obtained from the preprocessing results. The following Table 2 explains the results of the transformation in the form of codes used for the course

Table 2. Course Transformation

Kode	Mata Kuliah
B1	Agama Islam
B2	Algoritma Pemrograman
B3	Basis data
B4	Computer Vision
B5	Daspro
B6	data mining
B7	E- commerce
B8	E-government
B9	Entrepreneurship
B10	Sistem Digital
B11	Interaksi Manusia Komputer
B12	Jaringan Komputer
B13	Kalkulus
B14	Keamanan Komputer
B15	Kecerdasan buatan
B16	GIS
B17	Manajemen project
B18	Matematika Diskrit
B19	pemograman
B20	Pemrograman mobile
B21	Pemrograman web
B22	Pengantar Teknologi Informasi
B23	Pengembangan Aplikasi Mobile
B24	Pengolahan Citra
B25	Probabilitas dan Statistika
B26	Programming
B27	Jarkom Lanjut
B28	PSTI

Kode	Mata Kuliah
B29	Pemrograman Fundamental
B30	Sistem Informasi
B31	Sistem Operasi
B32	Strategi Algoritma
B33	Struktur Data
B34	TA
B35	Teknologi Informasi Web
B36	KP
B37	Desain grafis
B38	E-Bisnis
B39	Ekonomi teknik
B40	Enabling skill
B41	Pengenalan Pola
B42	Teori Bahasa dan Otomata
B43	Internet Programming
B44	IT Service Management
B45	Machine Learning
B46	Microsoft Office
B47	Perencanaan Manajemen Jaringan
B48	OOP
B49	Rekayasa perangkat lunak
B50	Tata Kelola Teknologi Informasi
B51	Sistem Pendukung Keputusan
B52	Statistik
B53	Technopreneurship
B54	Teknologi Industri
B55	UI/UX Designer

1. Data Mining

At the stage of starting to process data using an a priori algorithm. Here are the steps:

a. Perform matrices between Courses and Work from the data that has been obtained. At this stage, every course that appears with the work will be given symbol 1. Here's Figure 6. The result of the matrix mapping

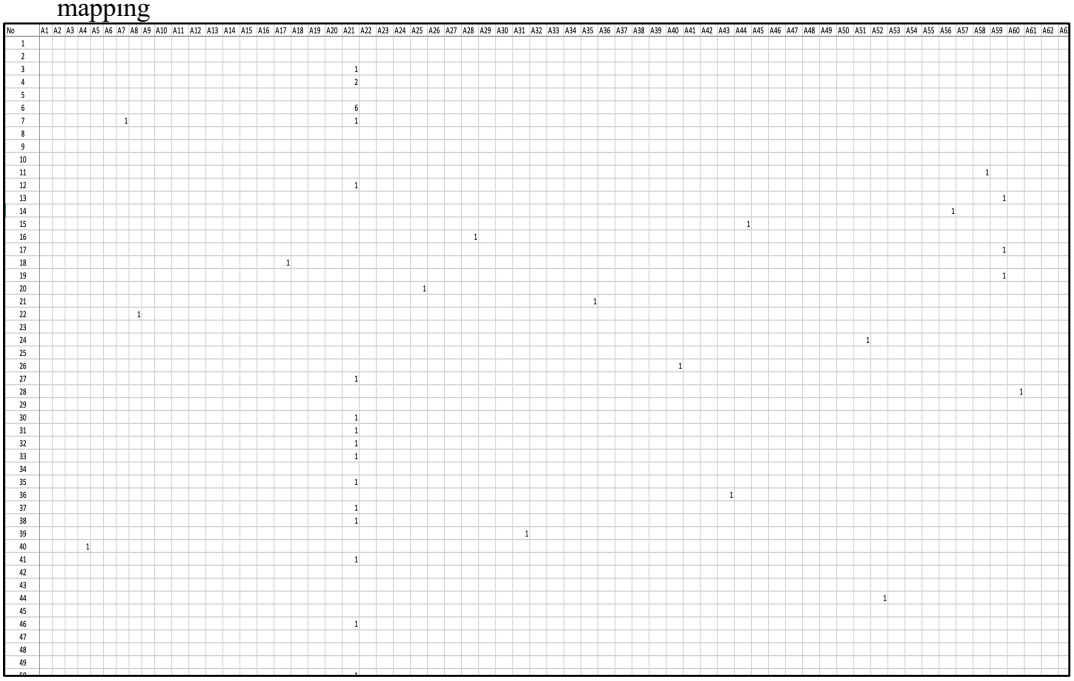

Figure 6. Results of MK matrix mapping and Work

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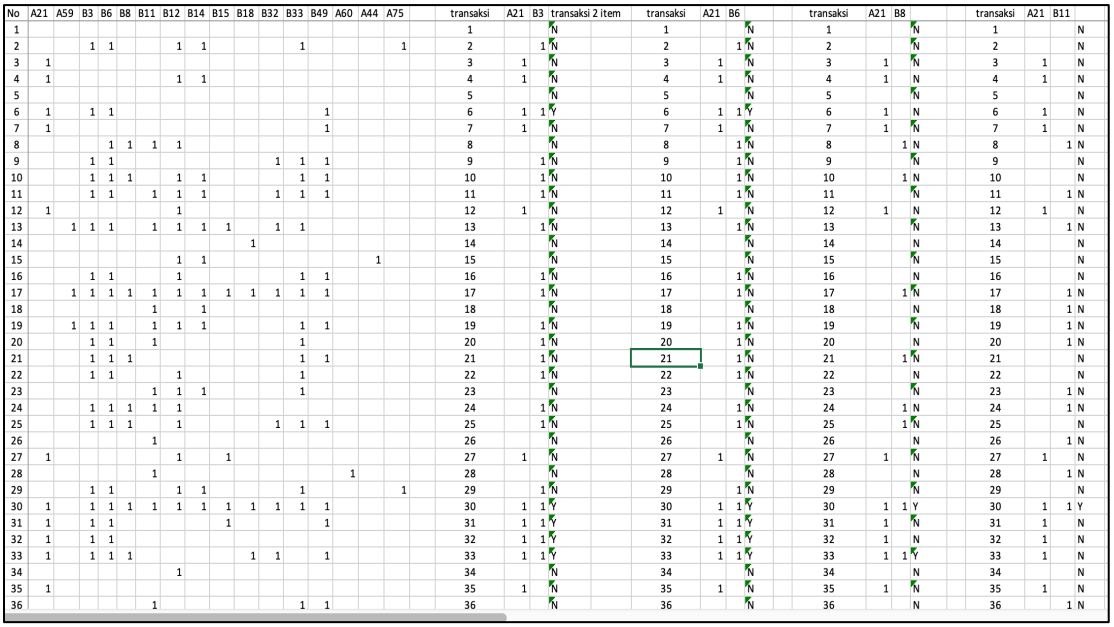
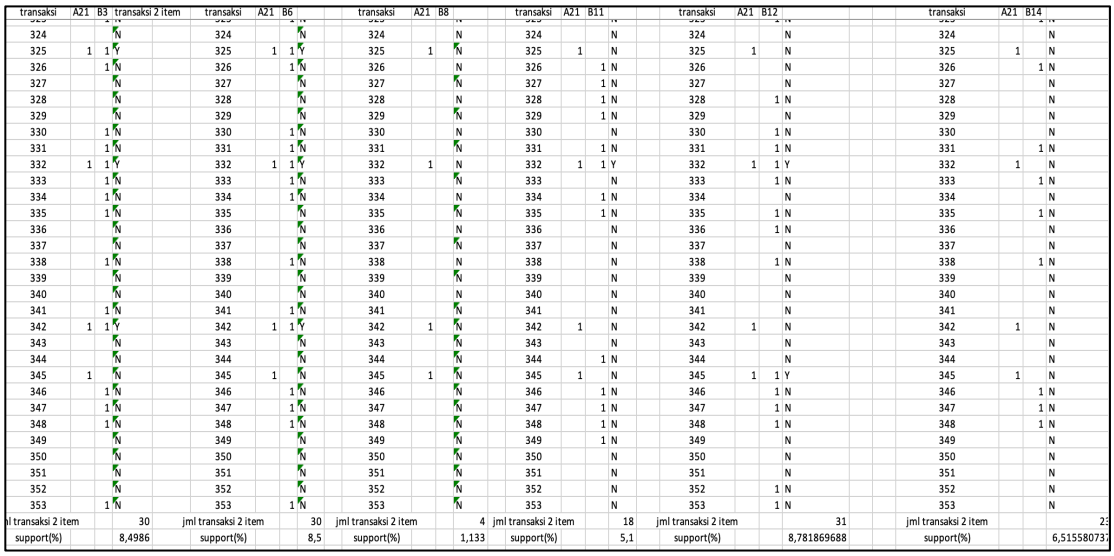
Next, a calculation is carried out for the linkage matrix between the MK and Job itemsets, where each MK item that appears will be mapped to the Job itemset. Figure 7 explains the relatedness of the item



No	A21	A59	B3	B6	B8	B11	B12	B14	B15	B18	B32	B33	B49	A60	A44	A75	transaksi	A21	B3	transaksi 2 item	transaksi	A21	B6		transaksi	A21	B8		transaksi	A21	B11	
1																	1			N	1			N	1			N	1			N
2			1	1			1	1				1				1	2		1	N	2		1	N	2			N	2			N
3	1																3	1		N	3	1		N	3	1		N	3	1		N
4	1						1	1									4	1		N	4	1		N	4	1		N	4	1		N
5																	5			N	5			N	5			N	5			N
6	1		1	1									1				6	1	1	Y	6	1	1	Y	6	1		N	6	1		N
7	1												1				7	1		N	7	1		N	7	1		N	7	1		N
8				1	1	1	1										8			N	8		1	N	8		1	N	8		1	N
9			1	1							1	1	1				9		1	N	9		1	N	9			N	9			N
10			1	1	1		1	1				1	1				10		1	N	10		1	N	10		1	N	10			N
11			1	1		1	1	1			1	1	1				11		1	N	11		1	N	11			N	11		1	N
12	1						1										12	1		N	12	1		N	12	1		N	12	1		N
13		1	1	1		1	1	1	1		1	1					13		1	N	13		1	N	13			N	13		1	N
14										1							14			N	14			N	14			N	14			N
15							1	1							1		15			N	15			N	15			N	15			N
16			1	1			1					1	1				16		1	N	16		1	N	16			N	16			N
17		1	1	1	1	1	1	1	1	1	1	1	1				17		1	N	17		1	N	17		1	N	17		1	N
18						1		1									18			N	18			N	18			N	18		1	N
19		1	1	1		1	1	1				1	1				19		1	N	19		1	N	19			N	19		1	N
20			1	1		1						1					20		1	N	20		1	N	20			N	20		1	N
21			1	1	1							1	1				21		1	N	21		1	N	21		1	N	21			N
22			1	1			1					1					22		1	N	22		1	N	22			N	22			N
23						1	1	1				1					23			N	23			N	23			N	23		1	N
24			1	1	1	1	1										24		1	N	24		1	N	24		1	N	24		1	N
25			1	1	1		1				1	1	1				25		1	N	25		1	N	25		1	N	25			N
26						1											26			N	26			N	26			N	26		1	N
27	1						1		1								27	1		N	27	1		N	27	1		N	27	1		N
28						1								1			28			N	28			N	28			N	28		1	N
29			1	1			1	1				1				1	29		1	N	29		1	N	29			N	29			N
30	1		1	1	1	1	1	1	1	1	1	1	1				30	1	1	Y	30	1	1	Y	30	1	1	Y	30	1	1	Y
31	1		1	1					1				1				31	1	1	Y	31	1	1	Y	31	1		N	31	1		N
32	1		1	1													32	1	1	Y	32	1	1	Y	32	1		N	32	1		N
33	1		1	1	1					1	1		1				33	1	1	Y	33	1	1	Y	33	1	1	Y	33	1		N
34							1										34			N	34			N	34			N	34			N
35	1																35	1		N	35	1		N	35	1		N	35	1		N
36						1						1	1				36			N	36			N	36			N	36		1	N

Figure 7. Interrelation of each Itemset

The following is the result of the calculation of the relationship in each item so that the value of support between itemsets is obtained



transaksi	A21	B3	transaksi 2 item	transaksi	A21	B6		transaksi	A21	B8		transaksi	A21	B11		transaksi	A21	B12		transaksi	A21	B14	
324			N	324			N	324			N	324			N	324			N	324			N
325	1	1	Y	325	1	1	Y	325	1		N	325	1		N	325	1		N	325	1		N
326		1	N	326		1	N	326			N	326		1	N	326			N	326		1	N
327			N	327			N	327			N	327		1	N	327			N	327			N
328			N	328			N	328			N	328		1	N	328		1	N	328			N
329			N	329			N	329			N	329		1	N	329			N	329			N
330		1	N	330		1	N	330			N	330			N	330		1	N	330			N
331		1	N	331		1	N	331			N	331		1	N	331		1	N	331		1	N
332	1	1	Y	332	1	1	Y	332	1		N	332	1	1	Y	332	1	1	Y	332	1		N
333		1	N	333		1	N	333			N	333			N	333		1	N	333		1	N
334		1	N	334		1	N	334			N	334		1	N	334			N	334			N
335		1	N	335			N	335			N	335		1	N	335		1	N	335		1	N
336			N	336			N	336			N	336			N	336		1	N	336			N
337			N	337			N	337			N	337			N	337			N	337			N
338		1	N	338		1	N	338			N	338			N	338		1	N	338		1	N
339			N	339			N	339			N	339			N	339			N	339			N
340			N	340			N	340			N	340			N	340			N	340			N
341		1	N	341		1	N	341			N	341			N	341			N	341			N
342	1	1	Y	342	1	1	Y	342	1		N	342	1		N	342	1		N	342	1		N
343			N	343			N	343			N	343			N	343			N	343			N
344			N	344			N	344			N	344		1	N	344			N	344			N
345	1		N	345	1		N	345	1		N	345	1		N	345	1	1	Y	345	1		N
346		1	N	346		1	N	346			N	346		1	N	346		1	N	346		1	N
347		1	N	347		1	N	347			N	347		1	N	347		1	N	347		1	N
348		1	N	348		1	N	348			N	348		1	N	348		1	N	348		1	N
349			N	349			N	349			N	349		1	N	349			N	349			N
350			N	350			N	350			N	350			N	350			N	350			N
351			N	351			N	351			N	351			N	351			N	351			N
352			N	352			N	352			N	352			N	352		1	N	352			N
353		1	N	353		1	N	353			N	353			N	353		1	N	353			N
l transaksi 2 item			30	jml transaksi 2 item			30	jml transaksi 2 item			4	jml transaksi 2 item			18	jml transaksi 2 item			31	jml transaksi 2 item			23
support(%)			8,4986	support(%)			8,5	support(%)			1,133	support(%)			5,1	support(%)			8,781869688	support(%)			6,515580737

Figure 8. Support Results Value

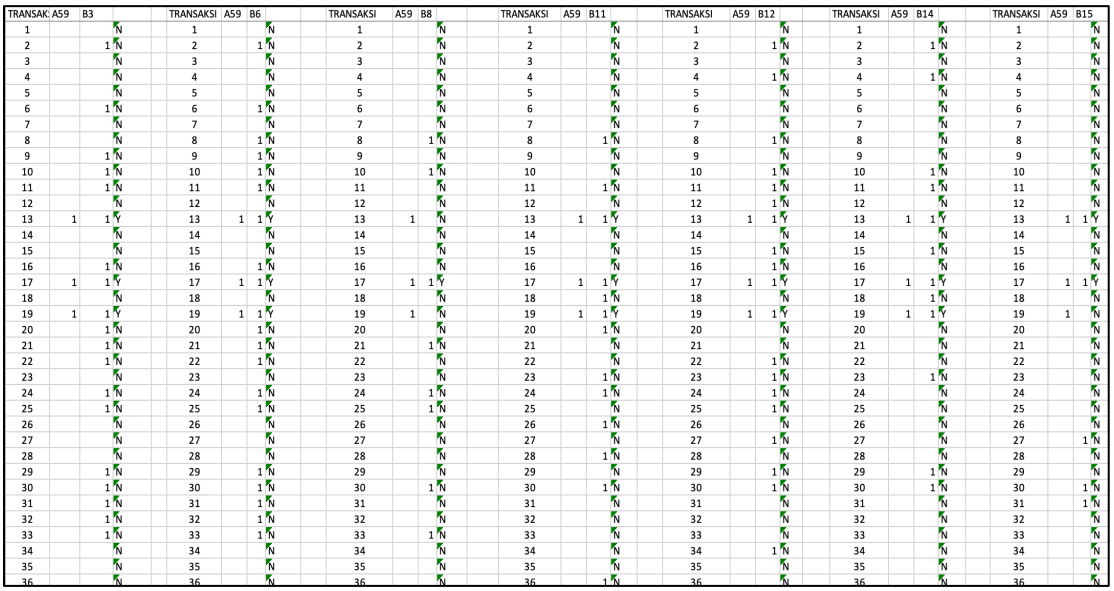


Figure 9. The calculation for the following item

The following are the results of Support values for two itemsets in mapping between Course (A) and Field of Work (B)

Table 3. Support Value

NAME	SUM	SUPPORT (%)
A21B3	30	8,498584
A21B6	30	8,498584
A21B8	4	1,133144
A21B11	18	5,09915
A21B12	31	8,78187
A21B14	23	6,515581
A21B15	27	7,648725
A21B18	14	3,966006
A21B32	11	3,116147
A21B33	16	4,532578
A21B49	31	8,78187
A59B3	39	11,04816
A59B6	39	11,04816
A59B8	3	0,849858
A59B11	26	7,365439
A59B12	20	5,665722
A59B14	18	5,09915
A59B15	11	3,116147
A59B18	4	1,133144
A59B32	24	6,798867
A59B33	37	10,48159
A59B49	40	11,33144
A60B3	8	2,266289
A60B6	8	2,266289
A60B8	2	0,566572
A60B11	7	1,983003
A60B12	8	2,266289
A60B14	5	1,416431

NAME	SUM	SUPPORT (%)
A60B15	3	0,849858
A60B18	1	0,283286
A60B32	1	0,283286
A60B33	3	0,849858
A60B49	5	1,416431
A44B3	4	1,133144
A44B6	3	0,849858
A44B8	0	0
A44B11	4	1,133144
A44B12	15	4,249292
A44B14	12	3,399433
A44B15	1	0,283286
A44B18	1	0,283286
A44B32	1	0,283286
A44B33	4	1,133144
A44B49	3	0,849858
A75B3	11	3,116147
A75B6	11	3,116147
A75B8	3	0,849858
A75B11	9	2,549575
A75B12	8	2,266289
A75B14	9	2,549575
A75B15	4	1,133144
A75B18	2	0,566572
A75B32	4	1,133144
A75B33	9	2,549575
A75B49	6	1,699717

Here are the calculation results for three different itemsets

Table 4. For 3 itemsets

TRANSAKSI	A59	B3	B6			TRANSAKSI	A59	B3	B33			TRANSAKSI	A59	B3	B49			TRANSAKSI	A59	B6	B49	
1				N		1				N		1				N		1				N
2		1	1	N		2		1	1	N		2		1		N		2		1		N
3				N		3				N		3				N		3				N
4				N		4				N		4				N		4				N
5				N		5				N		5				N		5				N
6		1	1	N		6		1		N		6		1	1	N		6		1	1	N
7				N		7				N		7			1	N		7			1	N
8			1	N		8				N		8				N		8		1		N
9		1	1	N		9		1	1	N		9		1	1	N		9		1	1	N
10		1	1	N		10		1	1	N		10		1	1	N		10		1	1	N
11		1	1	N		11		1	1	N		11		1	1	N		11		1	1	N
12				N		12				N		12				N		12				N
13	1	1	1	Y		13	1	1	1	Y		13	1	1		N		13	1	1		N
14				N		14				N		14				N		14				N
15				N		15				N		15				N		15				N
16		1	1	N		16		1	1	N		16		1	1	N		16		1	1	N
17	1	1	1	Y		17	1	1	1	Y		17	1	1	1	Y		17	1	1	1	Y
18				N		18				N		18				N		18				N
19	1	1	1	Y		19	1	1	1	Y		19	1	1	1	Y		19	1	1	1	Y
20		1	1	N		20		1	1	N		20		1		N		20		1		N
....		.	.	.		...		.	.	.		..		.	.	.		..	.	.	.	.
....		.	.	.		...		.	.	.		..		.	.	.		..	.	.	.	.
345				N		345			1	N		345			1	N		345			1	N
346		1	1	N		346		1	1	N		346		1	1	N		346		1	1	N
347		1	1	N		347		1	1	N		347		1	1	N		347		1	1	N
348		1	1	N		348		1	1	N		348		1	1	N		348		1	1	N
349				N		349			1	N		349			1	N		349			1	N
350				N		350				N		350				N		350				N
351				N		351				N		351				N		351				N
352	1			N		352	1			N		352	1			N		352	1			N
353		1	1	N		353		1	1	N		353		1	1	N		353		1	1	N
jml transaksi 3 item			39			jml transaksi 3 item			34			jml transaksi 3 item			35			jml transaksi 3 item			35	
support(%)			11			support(%)			9,6			support(%)			9,9			support(%)			9,92	

Here are the Support Results for the three items:

Table 5. Support for 3 itemsets

NAMA	JUMLAH	SUPPORT (%)
A59B3B6	39	11,048
A59B3B33	34	9,6317
A59B3B49	35	9,915
A59B6B49	35	9,915

Confidence value for three items set

Table 6. Value Confidence

Itemset	Confidence		Itemset	Confidence		Itemset	Confidence		Itemset	Confidence		Itemset	Confidence
B14A21	1,786885246		B14A59	2,18		B14A60	6,411764706		B14A44	7,266666667		B14A75	6,8125
A21B15	1,016666667		A59B15	0,833333333		A60B15	0,283333333		A44B15	0,25		A75B15	0,266666667
B15A21	0,983606557		B15A59	1,2		B15A60	3,529411765		B15A44	4		B15A75	3,75
A21B18	1,694444444		A59B18	1,388888889		A60B18	0,472222222		A44B18	0,416666667		A75B18	0,444444444
B18A21	0,590163934		B18A59	0,72		B18A60	2,117647059		B18A44	2,4		B18A75	2,25
A21B32	0,938461538		A59B32	0,769230769		A60B32	0,261538462		A44B32	0,230769231		A75B32	0,246153846
B32A21	1,065573 77		B32A59	1,3		B32A60	3,823529412		B32A44	4,333333333		B32A75	4,0625
A21B33	0,491935484		A59B33	0,403225806		A60B33	0,137096774		A44B33	0,120967742		A75B33	0,129032258
B33A21	2,032786885		B33A59	2,48		B33A60	7,294117647		B33A44	8,266666667		B33A75	7,75
A21B49	0,451851852		A59B49	0,3703703 7		A60B49	0,125925926		A44B49	0,111111111		A75B49	0,118518519
B49A21	2,213114754		B49A59	2,7		B49A60	7,941176471		B49A44	9		B49A75	8,4375

The amount that meets 10% support and 10% confidence is

Table 7. Itemsets that meet Support and Confidence above 10%

NAMA	JUMLAH	SUPPORT (%)		NAMA	CONFIDENCE (%)
A59B3	39	11,04815864		B3A44	11,13333333
A59B6	39	11,04815864		B12A44	10,33333333
A59B33	37	10,4815864		B3A75	10,4375
A59B49	40	11,33144476			
A59B3B6	39	11,04815864			

Data Interpretation and Data Analysis

At this stage, the results of research experiments are taken, namely:

a. For the type of programmer job, the most influential course is the Software Engineering Course, with the highest percentage of support being 11.33%.
b. Apart from the Software Engineering Course, which is very influential on the work as a Programmer is the Database and Data Mining Course, which has the support of 11.048%
c. The courses that have the highest Support scores are Database (51.3846%), Software Engineering (41.538%), Computer Network (47.6923%), and Human-Computer Interaction (43.3846%)
d. For the highest Confidence score, there is a strong relationship between the type of work as a Network Administrator and the Computer Network Course.

CONCLUSION

The calculations using an a priori algorithm concluded that the most popular job professions by the Informatics Engineering Study Program alumni are educators, in this case, teachers and lecturers, with a support value of 18.7692% and programmers of 15.3846%. In comparison, the very influential courses are Databases, Computer Networks, Computer Human Interaction and Software Engineering. This is an input for the Informatics Engineering Study Program to be more concerned and prioritize / superior to the course regarding RPS, teaching, and teaching methods. So courses that are very influential and support the work become better and of higher quality. It is expected that alumni of the Informatics Engineering Study Program will master classes that are decisive in the world of work.

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