TUGAS UAS MACHINE LEARNING

Experiment Data Transaksi Pembelian Retail

Disusun guna memenuhi tugas mata kuliah

Machine Learning

Dosen Pengampu:

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Kelompok 6

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1. Latar Belakang

Dalam konteks era digital yang semakin berkembang, perusahaan ritel memiliki akses melimpah terhadap data transaksi pembelian, menyimpan sejumlah besar informasi berharga mengenai perilaku konsumen dan preferensi produk. Penggunaan teknik analisis data yang canggih, khususnya algoritma Association Rules seperti Apriori, menjadi esensial dalam menggali wawasan mendalam terkait pola pembelian pelanggan. Data transaksi retail, yang mencakup detail produk, jumlah pembelian, dan informasi pelanggan, menjadi kunci untuk merumuskan strategi pemasaran yang lebih efektif.

Dalam eksperimen ini, fokus diberikan pada implementasi algoritma Apriori pada dataset transaksi pembelian retail. Algoritma ini, melalui prinsip "support," "confidence," dan "lift," bertujuan untuk mengidentifikasi pola pembelian yang signifikan. Analisis asosiasi antara item-item yang sering dibeli bersama diharapkan dapat memberikan pandangan mendalam terkait preferensi konsumen dan hubungan antar produk.

Tujuan utama eksperimen adalah untuk mengoptimalkan strategi pemasaran dan meningkatkan efisiensi operasional perusahaan. Hasil dari algoritma Apriori diharapkan dapat memberikan aturan asosiasi yang kuat dan dapat diinterpretasikan. Dengan memahami pola pembelian yang muncul, perusahaan dapat menyesuaikan penempatan produk di rak, mengatur strategi harga, dan memberikan rekomendasi produk yang lebih personal kepada pelanggan.

Melalui penerapan algoritma ini, eksperimen berharap dapat memberikan pandangan yang mendalam dan aplikatif terhadap perilaku pembelian, yang pada gilirannya akan membantu perusahaan untuk tetap kompetitif dan responsif terhadap perubahan pasar yang dinamis.

2. Tujuan

Tujuan dari experiment data kami memprediksi perilaku pembelian dari dataset transaksi pembelian retail dengan menggunakan algoritma Association Rules, yaitu Apriori.

3. Model Komputasi dan Penjelasan

Diagram proses/flowchart/tahapan yang di coding.

a. Persiapan Data

1.) Data Preprocessing

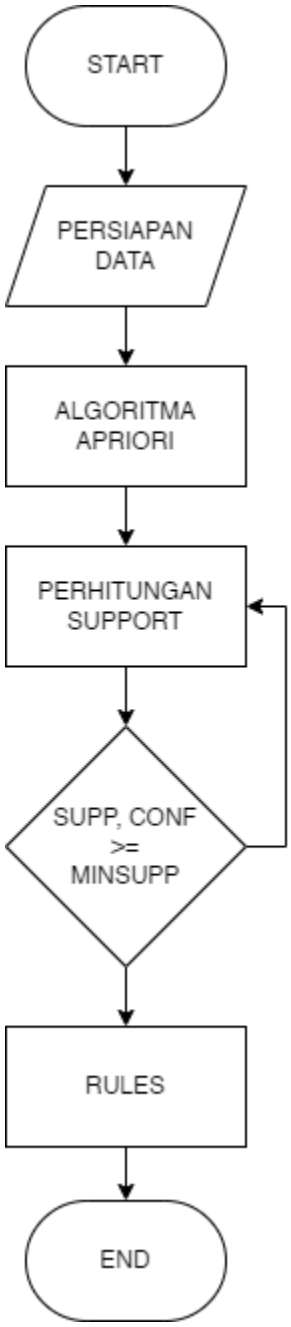
Pada data transaksi pembelian retail ini kami melakukan beberapa praproses, diantaranya :

- Mengganti apabila ada item yang hampir sama. Contoh, SHAMPOO dan SHAMPO.
- Menghapus item yang masih terdapat merek.
- Mengubah item yang terdapat jumlahnya. Contoh, SUSU(2) menjadi SUSU
- Mengubah item yang terdapat berat bersihnya. Contoh, SUSU250ml menjadi SUSU.
- Menghapus data NA (NULL).

2.) Data Transformation

Mengubah dataset yang semula berbentuk kolom menjadi format yang menggunakan koma.

b. Proses *mining* dengan Algoritma *Apriori*



Gambar 3.1 Proses Experiment Data dengan algoritma Apriori

4. **Coding di R**

Menginstall beberapa packages, yaitu arules, arulesViz, tidry.

Fungsi library tersebut :

- arules : Analisis aturan asosiasi.
- readxl : Membaca data Excel ke R.
- arulesViz : Visualisasi aturan asosiasi.
- tidyr : Membersihkan dan merapikan data.
- plyr : Split-apply-combine untuk manipulasi data.

```
#download library arules untuk menggunakan fp growth

install.packages("arules")

install.packages("arulesViz")

install.packages("tidyr")

install.packages("plyr")



library(arules)

library(arulesViz)

library(readxl)

library(tidyr)

library(plyr)
```

Membaca file excel transaksi retail

```
read_excel("C:/Kuliah/3rd                              semester/Machine
Learning/Data_Transaksi_Gabungan_Y.xlsx",col_names = FALSE) -> df
```

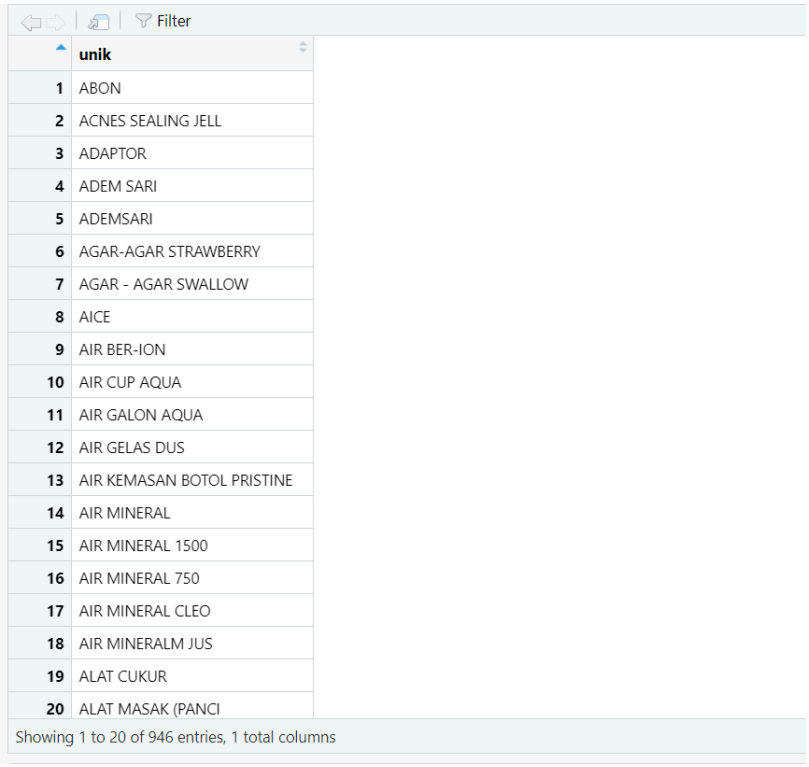
Melakukan Praproses dengan cara mengumpulkan nilai unik dari semua kolom dan menggabungkannya menjadi satu vektor.

```
# Mengumpulkan nilai unik dari semua kolom dan menggabungkannya menjadi satu vektor

unique_values <- unique(unlist(df))

# Menampilkan hasil

View(unique_values)
```

Menghilangkan data yang NA atau NULL serta mengubah data menjadi data frame agar mudah dilihat

```
# menghilangkan data yg NA

unik <- na.omit(unique_values)

unik <- sort(unik)

View(unik)



#Ubah menjadi data frame agar mudah dilihat

unik <- data.frame(unik)

View(unik)

df2 <- df
```

Tujuan dari pengumpulan nilai unik adalah untuk memeriksa apakah terdapat data transaksi yang formatnya masih berbeda. Contohnya masih terdapat merek, memiliki kemiripan, terdapat angka pada item (seharusnya string) dan lainnya.



Filter

	unik
1	ABON
2	ACNES SEALING JELL
3	ADAPTOR
4	ADEM SARI
5	ADEMSARI
6	AGAR-AGAR STRAWBERRY
7	AGAR - AGAR SWALLOW
8	AICE
9	AIR BER-ION
10	AIR CUP AQUA
11	AIR GALON AQUA
12	AIR GELAS DUS
13	AIR KEMASAN BOTOL PRISTINE
14	AIR MINERAL
15	AIR MINERAL 1500
16	AIR MINERAL 750
17	AIR MINERAL CLEO
18	AIR MINERALM JUS
19	ALAT CUKUR
20	ALAT MASAK (PANCI

Showing 1 to 20 of 946 entries, 1 total columns

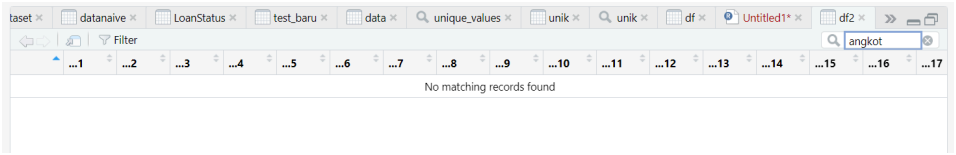
Gambar 4.1 Tampilan Data Unik dari Dataset

Menghapus item yang tidak berhubungan dan tidak penting dengan mengubahnya menjadi NA atau NULL

```
# Values to be replaced with NA

replace_values <-c("ANGKOT", "ATM", "CALCIUM ION", "FILM", "FOSFOR
ANORGANIK", "HEMATOLOGI LENGKAP","GLAD AOE PEONY", "KOIN", "KURSI",
"KOP", "MIN-BEE", "WARDAH", "TIKET", "CALUNG", "CILUNG","SUSU
KENTANG DETERJEN PERQLATAN MANDI AIR")



for (col in names(df2)) {

  df2[[col]][df2[[col]] %in% replace_values] <- NA

}
```

```
View(df)

View(df2)
```

Memeriksa apakah item yang ingin dihapus sudah terhapus.



Gambar 4.2 Memeriksa Item "ANGKOT" pada Data Frame 2 (Unik)

Mengubah item yang jenisnya sama menjadi nama item yang sama

```
mapping <- c(

  "ACNES SEALING JELL" = "KRIM WAJAH",

  "ADEM SARI" = "MINUMAN KESEHATAN",

  "AGAR-AGAR STRAWBERRY" = "AGAR-AGAR",

  "AGAR - AGAR SWALLOW" = "AGAR-AGAR",

  "BUBUK AGAR - AGAR" = "AGAR-AGAR",

  "BUBUK PUDING" = "AGAR-AGAR",

  "AICE" = "ES KRIM",

  "BOBA SUNDAE" = "ES KRIM",

  "CHAMPINA" = "ES KRIM",

  "CHOCOLATE LUCKY SUNDAE" = "ES KRIM",

  "CORNETO MINI" = "ES KRIM",

  "CORNETTO" = "ES KRIM",

  "ES KRIM WALLS" = "ES KRIM",
```

```
"ESKRIM" = "ES KRIM",

"ICE CREAM" = "ES KRIM",

"AIR BER-ION" = "MINUMAN ISOTONIK",

"ISOPLUS COCO" = "MINUMAN ISOTONIK",

"AIR CUP AQUA" = "AIR MINERAL GELAS",

"AIR GELAS DUS" = "AIR MINERAL GELAS",

"AQUA GELAS BOX" = "AIR MINERAL GELAS",

"AQUA GELAS DUS" = "AIR MINERAL GELAS",

"AIR KEMASAN BOTOL PRISTINE" = "AIR MINERAL BOTOL",

"AIR MINERAL" = "AIR MINERAL BOTOL",

"AIR MINERAL 1500" = "AIR MINERAL BOTOL",

"AIR MINERAL 750" = "AIR MINERAL BOTOL",

"AIR MINERAL CLEO" = "AIR MINERAL BOTOL",

"AIR MINERALM JUS" = "AIR MINERAL BOTOL",

"AQUA BOTOL" = "AIR MINERAL BOTOL",

"AQUA GALON" = "AIR MINERAL GALON",

"AIR GALON AQUA" = "AIR MINERAL GALON",

"ALAT MASAK (PANCI" = "PANCI",

"ALAT PEMBERSIH KLOSET" = "SIKAT KAMAR MANDI",

"ALAT SIKAT GIGI" = "SIKAT GIGI",

"ALPHALIBE" = "PERMEN",

"ALPHELIEBE" = "PERMEN",

"CHUPA CHUPS" = "PERMEN",
```

```
"AMARYL M 30 TABLET" = "OBAT DIABETES",

"APEL FUJI" = "APEL",

"AYAM KRISPY" = "AYAM GORENG",

"BAKSO KEJU" = "BAKSO",

"BAKSO ORI" = "BAKSO",

"BASO KEJU" = "BAKSO",

"BASO ORI" = "BAKSO",

"BASO URAT" = "BAKSO",

"CEDEA BASO CUMI" = "BAKSO",

"CEDEA BASO UDANG" = "BAKSO",

"BATAGOR KUAH" = "BATAGOR",

"BATERAI ABC" = "BATERAI",

"BAYAM)" = "BAYAM",

"BAYGON" = "OBAT NYAMUK",

"BEAR BRAND" = "SUSU",

"BEAR ORI 189ML" = "SUSU",

"DAIRY MILK" = "SUSU",

"DANCOW" = "SUSU",

"DIAMOND STR" = "SUSU",

"FF COCONUT TPK" = "SUSU",

"FRISIAN FLAG" = "SUSU",

"GREENFIELDS" = "SUSU",

"HILO" = "SUSU",
```

```
"INDOMILK" = "SUSU",

"BAWANG" = "BAWANG MERAH",

"BAWANG DAUN" = "DAUN BAWANG",

"BENG BENG SHARE IT" = "KUE",

"BENGBENG" = "KUE",

"BENGBENG" = "KUE",

"ASTOR" = "KUE",

"CHOCOLATOS" = "KUE",

"BERAS RAMOS" = "BERAS",

"BEST WOK MIE" = "MIE INSTAN",

"INDOMIE" = "MIE INSTAN",

"BERNARD EASY BITE" = "MAKANAN ANJING",

"BIHUN JAGUNG" = "BIHUN",

"BINTANG" = "MINUMAN BERKARBONASI",

"COCA-COLA" = "MINUMAN BERKARBONASI",

"COCA COLA" = "MINUMAN BERKARBONASI",

"FANTA" = "MINUMAN BERKARBONASI",

"GREEN SANDS" = "MINUMAN BERKARBONASI",

"BIORE" = "SABUN CUCI MUKA",

"BETTER" = "BISKUIT",

"BISKIES" = "BISKUIT",

"BISKUIT REGAL" = "BISKUIT",

"BISKUIT ROMA" = "BISKUIT",
```

```
"BRIO POTATO" = "BISKUIT",

"BRIO POTATO BISCUTIT" = "BISKUIT",

"CHOCO PIE" = "BISKUIT",

"GLICO POCKY" = "BISKUIT",

"GO POTATO" = "BISKUIT",

"HATARI" = "BISKUIT",

"HELLO PANDA" = "BISKUIT",

"GERY SALUT" = "BISKUIT",

"BLASTER" = "PERMEN",

"BLUE BAND" = "MARGARIN",

"BODY LOTION" = "LOTION",

"BON NORI" = "RUMPUT LAUT",

"BONCABE" = "CABAI BUBUK",

"BON CABE" = "CABAI BUBUK",

"BUAH" = "APEL",

"BUAH-BUAHAN (APEL" = "APEL",

"BUAHVITA" = "JUS",

"BUAVITA" = "JUS",

"BUBUK PUDING" = "PUDING",

"BUBUR AYAM INSTAN" = "BUBUR",

"BUBUR AYAN" = "BUBUR",

"BUBUR RASA AYAM" = "BUBUR",

"BUBUR SOTO" = "BUBUR",
```

```
"BUMBU DAPUR" = "BUMBU INSTAN",

"BUMBU MAGIC" = "BUMBU INSTAN",

"BUMBU NASI GORENG" = "BUMBU INSTAN",

"BUMBU RACIK" = "BUMBU INSTAN",

"BUMBU RACIK SAJIKU" = "BUMBU INSTAN",

"BUMBU RACIK SERBAGUNA" = "BUMBU INSTAN",

"BUMBU SASA" = "BUMBU INSTAN",

"BUMBU TOMYUM" = "BUMBU INSTAN",

"CADBURY" = "COKLAT",

"CADBURY DAIRY MILK" = "COKLAT",

"CHACHA" = "COKLAT",

"CHIC CHOC" = "COKLAT",

"COKELAT" = "COKLAT",

"COKI-COKI" = "COKLAT",

"COKLAT CADBURY" = "COKLAT",

"COKLAT DAN MINUMAN DINGIN" = "COKLAT",

"COKLAT DAN SUSU" = "COKLAT",

"DARK CHOCOLATTE" = "COKLAT",

"DELFI CHICCHOC" = "COKLAT",

"DELFI TAKE IT" = "COKLAT",

"CEDEA CHIKUWA" = "CHIKUWA",

"CEDEA SALMON BALL" = "SALMON BALL",

"CEDEA STICK KEPITING" = "STICK KEPITING",
```

```
"CELANA PENDEK" = "CELANA",

"CEMCEM" = "POPCORN",

"CHEETOS" = "SNACK",

"CHIKI" = "SNACK",

"CHIKI(2)" = "SNACK",

"CHITATO" = "SNACK",

"CITATO" = "SNACK",

"CRACKERS" = "SNACK",

"DORITOS" = "SNACK",

"FISH SNACK WRAP" = "SNACK",

"FITBAR" = "SNACK",

"FUZO" = "SNACK",

"GARUDA PILUS" = "SNACK",

"HAPPY TOS" = "SNACK",

"J&J PIATTOS" = "SNACK",

"JAPOTA" = "SNACK",

"CEREAL" = "SEREAL",

"DETERJEN" = "SABUN CUCI PAKAIAN",

"CEREAL KELLOGG'S" = "SEREAL",

"CHAMP SOSIS" = "SOSIS",

"CHAMP SOSIS AYAM" = "SOSIS",

"KENTANG GORENG" = "MAKANAN BERAT",

"CERES" = "MESES",
```

```
"CHCIKEN STEAK" = "MAKANAN BERAT",

"CHICKEN STEAK" = "MAKANAN BERAT",

"FRENCH FRIES" = "MAKANAN BERAT",

"CHEESE CROISSANT" = "ROTI",

"CIMORY" = "YOGHURT",

"CIMORY HONEY" = "YOGHURT",

"CIMORY YOGHURT" = "YOGHURT",

"GREEK YOGURT" = "YOGHURT",

"CLOSEUP" = "PASTA GIGI",

"COCO BIT SP GUAVA" = "MINUMAN BUAH",

"COTONBUD" = "COTTON BUDS",

"COTTON BUD" = "COTTON BUDS",

"CUTTONBUD" = "COTTON BUDS",

"CREAMER" = "WHIP CREAM",

"AYAM" = "DAGING AYAM",

"DAGING" = "DAGING SAPI",

"DAIA" = "SABUN CUCI PAKAIAN",

"DETERGEN" = "SABUN CUCI PAKAIAN",

"DETERGEN ATTACK" = "SABUN CUCI PAKAIAN",

"DETERGEN RINSO" = "SABUN CUCI PAKAIAN",

"DETERJEM" = "SABUN CUCI PAKAIAN",

"DETERJEN" = "SABUN CUCI PAKAIAN",

"DAN KARI" = "PENYEDAP RASA",
```

```
"DAZEL SLS" = "SELIMUT",

"DAZEL SELIMUT" = "SELIMUT",

"DELMONTE" = "SAOS SAMBAL",

"DELMONTE EXTRA HOT PET" = "SAOS SAMBAL",

"DEODARAN" = "DEODORANT",

"DEODORAN" = "DEODORANT",

"DORA RACUN TIKUS" = "RACUN TIKUS",

"DOWNY" = "PEWANGI PAKAIAN",

"DUMPLING CEDEA" = "DUMPLING",

"ENERGEN" = "MINUMAN ENERGI",

"EXTRA JOSS" = "MINUMAN ENERGI",

"ES KOPI" = "KOPI",

"GOOD TIME" = "BISKUIT",

"GOODTIME" = "BISKUIT",

"INDOCAFE" = "KOPI",

"ES COKLAT" = "MINUMAN",

"ES TEH" = "TEH",

"FRESHTEA JASMINE" = "TEH",

"FRESSTEA" = "TEH",

"FRESTEA" = "TEH",

"FRUIT TEA" = "TEH",

"FRUIT TEA APPLE" = "TEH",

"ICHI OCHA" = "TEH",
```

```
"ICHITAN" = "TEH",

"ICHITAN THAI MILK TEA" = "TEH",

"ICHITAN THAI TEA" = "TEH",

"JAVANA" = "TEH",

"FIESTA CHICKEN NUGGET" = "NUGGET",

"FIESTA NUGGET" = "NUGGET",

"FOX" = "LEM",

"GAJAH TIKUS TRAP" = "LEM TIKUS",

"GARNIER" = "SABUN CUCI MUKA",

"GARNIER MEN" = "SABUN CUCI MUKA",

"GARNIER PINK" = "SABUN CUCI MUKA",

"GARNIER MICELLAR WATER" = "PEMBERSIH WAJAH",

"GARUDA KACANG" = "KACANG",

"GIV" = "SABUN MANDI",

"GOCHUJANG" = "MAKANAN KOREA",

"JAJJANGMYEON" = "MAKANAN KOREA",

"GOOD MOOD" = "MINUMAN BUAH",

"HYDRA COCO" = "MINUMAN BUAH",

"GUKA MERAH" = "GULA MERAH",

"GULA PASIR" = "GULA PUTIH",

"HANDBODY" = "LOTION",

"HANDSAINITEZER" = "HAND SANITIZER",

"HANSAPLAST" = "PLASTER",
```

```
"HARPIC" = "PEMBERSIH TOILET",

"HARPIC PEMBERSIH KLOSET" = "PEMBERSIH TOILET",

"HIT (PEMBUNUH NYAMUK)" = "OBAT NYAMUK",

"IKAN SALMON" = "IKAN",

"JAMUR INOKITATE" = "JAMUR",

"JAMUR ENOKI" = "JAMUR",

"JAVANA" = "TEH",

"JAVANA MELATI" = "TEH",

"JERUK MEDAN" = "JERUK",

"JERUK)" = "JERUK",

"JETZ" = "SNACK",

"JUS JERUK" = "JUS",

"KACANG ATOM" = "KACANG",

"KACANG DUA KELINCI" = "KACANG",

"KACANG GARUDA" = "KACANG",

"KACANG TANAH" = "KACANG",

"KALDU BUBUK" = "PENYEDAP RASA",

"KALDU JAMUR" = "PENYEDAP RASA",

"KAPAL API" = "KOPI",

"KAPAS BAYGON" = "KAPAS",

"KAPAS WAJAH" = "KAPAS",

"KAPUR BARUS" = "KAMPER",

"KARA" = "SANTAN",
```

```
"KASA STERIL" = "KASA",

"KATSU EGG" = "MAKANAN BERAT",

"KBPS YOGHURT PLAIN" = "YOGHURT",

"KEJU CAKE" = "KUE",

"KEJU CRAFT" = "KEJU",

"KEJU KRAFT" = "KEJU",

"KEJU PRO CHIZ" = "KEJU",

"KENKO CUTTER" = "CUTTER",

"KHONG GUAN" = "KUE",

"KINDERJOY" = "COKLAT",

"KIRANA BASO SKL HIJAU" = "BAKSO",

"KISPRAY" = "PELICIN PAKAIAN",

"KIT KAT" = "COKLAT",

"KITKAT" = "COKLAT",

"KLINPAK CLING WRAP JUMBO REFFIL" = "PEMBERSIH KACA",

"KOKO KRUNCH" = "SEREAL",

"KOPI ABC" = "KOPI",

"KOPI GAJAH" = "KOPI",

"KOP GOODDAY" = "KOPI",

"KOPI SASET" = "KOPI",

"KOPIKO" = "PERMEN",

"KOPIKO CANDY" = "PERMEN",

"KOREK GAS" = "KOREK",
```

```
"KORNET 200G" = "KORNET",

"KRAFT CHEEDAR" = "KEJU",

"KRATINGDAENG" = "MINUMAN KESEHATAN",

"KRIPIK" = "KERIPIK",

"KRUPUK" = "KERUPUK",

"KUACI FUZO" = "KUACI",

"KUACI REBO" = "KUACI",

"KUE COKLAT" = "KUE",

"KUE OREO" = "BISKUIT",

"KUSUKA KEJU BAKAR" = "SNACK",

"LADA BUBUK" = "LADA",

"LADAKU MERICA BUBUK" = "LADA",

"LAMPU BOHLAM" = "LAMPU",

"LARUTAN CAP KAKI 3" = "MINUMAN KESEHATAN",

"LASEGAR" = "MINUMAN KESEHATAN",

"LAYS" = "SNACK",

"LE MINERALE" = "AIR MINERAL BOTOL",

"LEMONILO" = "MIE INSTAN",

"LEXUS" = "SNACK",

"LIP CREAM" = "LIP PRODUCT",

"LIPBALM" = "LIP PRODUCT",

"LIPTIN" = "LIP PRODUCT",

"LISTERINE" = "OBAT KUMUR",
```

```
"LOTION ANTI NYAMUK" = "REPELLANT NYAMUK",

"LOTION TUBUH" = "LOTION",

"LUWAK WHITE KOFEE" = "KOPI",

"MADU TJ" = "MADU",

"MAICIK" = "KERIPIK",

"MAITOS" = "SNACK",

"MAIZENA" = "TEPUNG MAIZENA",

"MAKANAN RINGAN" = "SNACK",

"MALANG SARI ASEM" = "PERMEN",

"MALKIST" = "BISKUIT",

"MALKIST KEJU" = "BISKUIT",

"MAMA LEMON" = "SABUN CUCI PIRING",

"MAMASUKA RUMPUT LAUT" = "RUMPUT LAUT",

"MANISAN(YUPI)" = "PERMEN",

"MARGARIN BLUEBAND" = "MARGARIN",

"MARJAN" = "SIRUP",

"MARJAN COCOPANDAN" = "SIRUP",

"MASAKO" = "PENYEDAP RASA",

"MASAKO AYAM" = "PENYEDAP RASA",

"MASAKO SAPI" = "PENYEDAP RASA",

"MASJER WAJAH GARNIER" = "MASKER WAJAH",

"MATCHA INSTAN" = "MINUMAN",

"MAXI CORN" = "SNACK",
```

```
"MAYASI" = "KACANG",

"MAYONAISE" = "MAYONNAISE",

"MAYUMI" = "MAYONNAISE",

"MENTOS" = "PERMEN",

"MENTOS CANDY" = "PERMEN",

"MERICA" = "LADA",

"MI INSTAN" = "MIE INSTAN",

"MICELLAR WATER" = "PEMBERSIH WAJAH",

"MIE" = "MIE INSTAN",

"MIE BURUNG DARA" = "MIE INSTAN",

"MIE GELAS" = "MIE INSTAN",

"MIE GORENG" = "MIE INSTAN",

"MIE JUMBO" = "MIE INSTAN",

"MIE SAMYANG" = "MIE INSTAN",

"MIE SEDAAP GORENG" = "MIE INSTAN",

"MIE WADAH BASO (2)" = "MIE INSTAN",

"MIE WADAH KR(2)" = "MIE INSTAN",

"MIEGHETTI" = "MIE INSTAN",

"MILK TEA" = "MINUMAN",

"MILO" = "SUSU",

"MINERAL WATER KEMASAN BOTOL" = "AIR MINERAL BOTOL",

"MINUMAN CINCAU" = "MINUMAN",

"MINUMAN DINGIN" = "MINUMAN",
```

```
"MINUMAN ION" = "MINUMAN ISOTONIK",

"MINUMAN ISOTONIC" = "MINUMAN ISOTONIK",

"MINUMAN JAHE" = "MINUMAN KESEHATAN",

"MINUMAN JERUK" = "MINUMAN BUAH",

"MINUMAN JUS" = "JUS",

"MINUMAN PROTEIN" = "MINUMAN KESEHATAN",

"MINUMAN SERBUK VITAMIN C1000 SACHET" = "MINUMAN VITAMIN",

"MINUMAN SODA" = "MINUMAN BERKARBONASI",

"MINUMAN SPRITE" = "MINUMAN BERKARBONASI",

"MINUMAN TEH" = "TEH",

"MINUMAN TEH BOTOL SOSRO" = "TEH",

"MINUMAN VITAMIN C1000" = "MINUMAN VITAMIN",

"MINUMAN THAILAND" = "MINUMAN",

"MINYAK" = "MINYAK GORENG",

"MINYAK GORENG FILMA" = "MINYAK GORENG",

"MINYAK GORENG SANIA" = "MINYAK GORENG",

"MISCELLAR WATER" = "PEMBERSIH WAJAH",

"MITU WIPE BLUE" = "TISU BASAH",

"MIZONE" = "MINUMAN ISOTONIK",

"MOGU-MOGU" = "MINUMAN",

"MOISTURIZER" = "PELEMBAB WAJAH",

"MOJITO" = "MINUMAN BERKARBONASI",

"MOLTO" = "PEWANGI PAKAIAN",
```

```
"MONDE SNACK" = "SNACK",

"MUJIGAE" = "MINUMAN",

"MY TEA" = "TEH",

"NABATI" = "WAFER",

"NASI AYAM BETUTU" = "MAKANAN BERAT",

"NASI GORENG" = "MAKANAN BERAT",

"NASI PADANG" = "MAKANAN BERAT",

"NASI SEGITA 100G" = "ONIGIRI",

"NASI SEGITA MAYO (2)" = "ONIGIRI",

"NATA DE COCO" = "MINUMAN BUAH",

"NESCAFE" = "KOPI",

"NESCAFE GOLD" = "KOPI",

"NESTAR" = "KOPI",

"NESTLE" = "AIR MINERAL BOTOL",

"NESTLE CEREAL" = "SEREAL",

"NESTLE PURE LIFE" = "AIR MINERAL BOTOL",

"NII GREENTEA" = "TEH",

"NORI" = "RUMPUT LAUT",

"NU CHOCO HAZELNUTEA" = "TEH",

"NUGET" = "NUGGET",

"NUGET AYAM" = "NUGGET",

"NUTELLA" = "COKLAT",

"NUTRI SARI" = "MINUMAN",
```

```
"NUTS" = "KACANG",

"NUVO" = "SABUN MANDI",

"NYAM-NYAM" = "SNACK",

"OAT BISKUIT" = "BISKUIT",

"OATSIDE" = "SUSU",

"OBAT SAKIT KEPALA" = "OBAT PUSING",

"ODENG" = "MAKANAN KOREA",

"OISHI PILLOWS" = "SNACK",

"OISHI POPPY" = "SNACK",

"OLATTE" = "MINUMAN",

"ONE PUSH VAPE" = "OBAT NYAMUK",

"ONIGIRI(2)" = "ONIGIRI",

"ORAL-B" = "SIKAT GIGI",

"ORANGE" = "JERUK",

"ORANGE WATER" = "MINUMAN BUAH",

"OREO" = "BISKUIT",

"OVOMALTINE" = "COKLAT",

"PANTENE" = "SHAMPO",

"PARFUM AXE" = "PARFUM",

"PARFUM BAJU" = "PEWANGI PAKAIAN",

"PARFUME" = "PARFUM",

"PASTA COKLAT" = "COKLAT",

"PASTA GIGI CLOSEUP" = "PASTA GIGI",
```

```
"PASTA GIGI SENSODYNE" = "PASTA GIGI",

"PASTA SPAGHETTI" = "SPAGHETTI",

"PEAR" = "PIR",

"PELEMBUT PAKAIAN DOWNY" = "PELEMBUT PAKAIAN",

"PELICIN PAKAIAN KISPRAY" = "PELICIN PAKAIAN",

"PEMBASMI NYAMUK" = "OBAT NYAMUK",

"PEMBERSIH LANTAI PORSTEX" = "PEMBERSIH LANTAI",

"PEMBERSIH MULUT" = "OBAT KUMUR",

"PEMBERSIH PAKAIAN" = "SABUN CUCI PAKAIAN",

"PEMBERSIH PIRING" = "SABUN CUCI PIRING",

"PEMUTIH BAYCLIN" = "PEMUTIH",

"PENCUCI MUKA" = "SABUN CUCI MUKA",

"PENCUCI PIRING" = "SABUN CUCI PIRING",

"PENGHARUM PAKAIAN" = "PEWANGI PAKAIAN",

"PENGHARUM RUANGAN STELLA" = "PENGHARUM RUANGAN",

"PENSIL FABER CASTELL" = "PENSIL",

"PENYEDAP" = "PENYEDAP RASA",

"PENYEDAP RASA (SASA)" = "PENYEDAP RASA",

"PENYEGAR RUANGAN" = "PENGHARUM RUANGAN",

"PEPSODENT" = "PASTA GIGI",

"PERASA MAKANAN" = "PENYEDAP RASA",

"PERFUME" = "PARFUM",

"PERMEN KARET" = "PERMEN",
```

```
"PEWANGI BAJU" = "PEWANGI PAKAIAN",

"PEWANGI RAUANGAN" = "PEWANGI RUANGAN",

"PILUS" = "SNACK",

"PKT BREAD.CO" = "ROTI",

"PLASTIK BESAR" = "PLASTIK",

"PLASTIK WRAP" = "PLASTIK",

"POCARI" = "MINUMAN ISOTONIK",

"POCKY" = "SNACK",

"POP MIE" = "MIE INSTAN",

"PORVITA MARGARIN" = "MARGARIN",

"POSH MEN" = "PARFUM",

"POTABEE" = "SNACK",

"PREMEN" = "PERMEN",

"PRIME BREAD" = "ROTI",

"PRINGLES" = "SNACK",

"PRINTER INK" = "TINTA",

"PRISTINE" = "AIR MINERAL BOTOL",

"PRISTINE AIR MINERAL" = "AIR MINERAL BOTOL",

"PRISTINE BOTOL" = "AIR MINERAL BOTOL",

"PROMINA" = "SNACK BAYI",

"PUDDING MANGGA" = "PUDING",

"PULPEN FABEL CASTELL" = "PULPEN",

"PULPY ORANGE" = "MINUMAN BUAH",
```

```
"QTELA" = "SNACK",

"QUAKER" = "OLAHAN GANDUM",

"RAINBOW POWER WALLS" = "ES KRIM",

"RAJAWALI TS PANJANG LABEL KUNING XL" = "TUSUK SATE",

"RAMEN" = "MIE INSTAN",

"REAL GOOD" = "SUSU",

"REDOXON" = "VITAMIN",

"REFIL PARFUM" = "PARFUM",

"REGULER NASI" = "NASI",

"RICH CREME WHIP CREAM POWDER" = "WHIP CREAM",

"RICOLA" = "PERMEN",

"RINSO" = "DETERJEN",

"RISOL MAYO" = "RISOL",

"ROMA" = "BISKUIT",

"ROMA KELAPA" = "BISKUIT",

"ROTI ISI" = "ROTI",

"ROTI SARI ROTI" = "ROTI",

"ROTI SARIROTI" = "ROTI",

"ROTI TAWAR" = "ROTI",

"ROTI TAWAR JUMBO" = "ROTI",

"ROYALE" = "PEWANGI PAKAIAN",

"ROYCO" = "PENYEDAP RASA",

"S-TEE" = "TEH",
```

```
"SABN CUCI PIRING" = "SABUN CUCI PIRING",

"SABUN BAJU" = "SABUN CUCI PAKAIAN",

"SABUN CUCI BAJU" = "SABUN CUCI PAKAIAN",

"SABUN CUCI MUKA GARNIER" = "SABUN CUCI MUKA",

"SABUN CUCI MUKA WARDAH" = "SABUN CUCI MUKA",

"SABUN DETOL" = "SABUN MANDI",

"SABUN GIV" = "SABUN MANDI",

"SABUN LIFEBUOY" = "SABUN MANDI",

"SABUN MANDI LIFEBUOY" = "SABUN MANDI",

"SABUN MUKA" = "SABUN CUCI MUKA",

"SABUN NUVO" = "SABUN MANDI",

"SABUN PEL" = "PEMBERSIH LANTAI",

"SABUN PEL LANTAI" = "PEMBERSIH LANTAI",

"SABUN PEMBERSIH MUKA" = "SABUN CUCI MUKA",

"SABUN PENCUCI MUKA" = "SABUN CUCI MUKA",

"SABUN SCOTCHBRITE" = "SPONS",

"SALAK PONDOH" = "SALAK",

"SAMBAL" = "SAOS SAMBAL",

"SAMPO" = "SHAMPO",

"SAMPO CLEAR" = "SHAMPO",

"SAMYANG" = "MIE INSTAN",

"SAOS" = "SAOS SAMBAL",

"SAOS ABC" = "SAOS SAMBAL",
```

```
"SAOS CABE" = "SAOS SAMBAL",

"SARDEN ABC SAUS TOMAT" = "SARDEN",

"SARI GANDUM" = "BISKUIT",

"SARI KACANG IJO" = "MINUMAN",

"SARI ROTI" = "ROTI",

"SARI ROTI COKLAT KEJU" = "ROTI",

"SARIMI" = "MIE INSTAN",

"SARIRAOS SIMPING" = "KUE",

"SAUS" = "SAOS SAMBAL",

"SNICKERS" = "SNACK",

"PLASTER" = "PLESTER",

"SAUS BOLOGNESE" = "SAOS BOLOGNASE",

"SAUS BULGOGI" = "SAOS BULGOGI",

"SAUS GOCHUJANG" = "SAOS GOCHUJANG",

"SAUS MAKANAN RINGAN" = "SAOS SAMBAL",

"SAUS SAMBAL" = "SAOS SAMBAL",

"SAUS SAMBAL EXTRA PEDAS ABC" = "SAOS SAMBAL",

"SAYUR" = "WORTEL",

"SAYURAN SEGAR (WORTEL" = "WORTEL",

"SEBLAK CAMPUR" = "SEBLAK",

"SEGITIGA BIRU" = "TEPUNG TERIGU",

"SELAI OLAI" = "BISKUIT",

"SENDOK)" = "SENDOK",
```

```
"SGM" = "SUSU",

"SHAMPOO" = "SHAMPO",

"SHAMPOO CLEAR" = "SHAMPO",

"SHAMPOO HEAD & SHOULDER" = "SHAMPO",

"SHAMPOO REJOYCE" = "SHAMPO",

"SHINZUI FACIAL WASH" = "SABUN CUCI MUKA",

"SIKAT" = "SIKAT GIGI",

"SIKAT GIGI FORMULA" = "SIKAT GIGI",

"SIKAT GIGI PEPSODENT" = "SIKAT GIGI",

"SILVER QUEEN" = "COKLAT",

"SILVERQUEEN" = "COKLAT",

"SINDE" = "MINUMAN KESEHATAN",

"SKINCARE" = "SABUN CUCI MUKA",

"SLAI O LAI" = "BISKUIT",

"SLAI OLAI"= "BISKUIT",

"SNACK BALADO 140" = "SNACK",

"SNACK BROWNIES" = "SNACK",

"SNACK SAPI" = "SNACK",

"SNICKERKS" = "SNACK",

"SO KLIN" = "PEMBERSIH LANTAI",

"SO KLIN LANTAI" = "PEMBERSIH LANTAI",

"SODA" = "MINUMAN BERKARBONASI",

"SODA LEMON" = "MINUMAN BERKARBONASI",
```

```
"MINUMAN BERSODA" =  "MINUMAN BERKARBONASI",

"SOFTDRINK" = "MINUMAN",

"SOFTEX" = "PEMBALUT",

"SOFTLENS" = "LENSA KONTAK",

"SOPTEX" = "PEMBALUT",

"SOSIS HANZEL" = "SOSIS",

"SOSIS INDOMARET" = "SOSIS",

"SOSIS KANZLER" = "SOSIS",

"SOSIS KANZLER GOCHUJANG DAN KEJU" = "SOSIS",

"SOSIS NUGGET" = "SOSIS",

"SOZZIZ" = "SOSIS",

"SPAGETI" = "SPAGHETTI",

"SPAGHETI" = "SPAGHETTI",

"SPON" = "SPONS",

"SPONGE" = "SPONS",

"SPONS CUCI PIRING STOTCH-BRITE" = "SPONS",

"SPRIT" = "MINUMAN BERKARBONASI",

"SPRITE" = "MINUMAN BERKARBONASI",

"STELA" = "PENGHARUM RUANGAN",

"STIK KEJU" = "SNACK",

"STRAWBERRY LUCKY SUNDAE" = "ES KRIM",

"SUKRO" = "KACANG",

"SUNCO POUCH" = "MINYAK GORENG",
```

```
"SUNLIGHT" = "SABUN CUCI PIRING",

"SUNSILK" = "SHAMPO",

"SUPER BUBUR" = "BUBUR",

"SUSU 200ML" = "SUSU",

"SUSU 250ML" = "SUSU",

"SUSU BENDERA" = "SUSU",

"SUSU BERUANG" = "SUSU",

"SUSU BUBUK" = "SUSU",

"SUSU CIMORY" = "SUSU",

"SUSU DANCOW" = "SUSU",

"SUSU INDOMILK" = "SUSU",

"SUSU KEDELAI" = "SUSU",

"SUSU KENTAL MANIS" = "SUSU",

"SUSU KENTAL MANIS CARNATION" = "SUSU",

"SUSU UHT" = "SUSU",

"SUSU UHT DIAMOND" = "SUSU",

"SUSU ULTRA" = "SUSU",

"SWALLOW SJD" = "SENDAL",

"TANGO" = "KUE",

"TARO" = "SNACK",

"TARO BALL" = "SNACK",

"TEBS" = "MINUMAN BERKARBONASI",

"TEH BOTOL" = "TEH",
```

```
"TEH BOTOL KOTAK" = "TEH",

"TEH GELAS" = "TEH",

"TEH JAVANA" = "TEH",

"TEH KEMASAN" = "TEH",

"TEH KOTAK" = "TEH",

"TEH POCI" = "TEH",

"TEH PUCUK" = "TEH",

"TEH PUCUK HARUM" = "TEH",

"TEH SOSRO" = "TEH",

"TEH TONG JI" = "TEH",

"TELOR" = "TELUR",

"TELUR AYAM" = "TELUR",

"TELUR AYAM NEGERI" = "TELUR",

"TELUR GABUS" = "SNACK",

"TEPUNG" = "TEPUNG TERIGU",

"TERIGU" = "TEPUNG TERIGU",

"TESSSA TISSUE" = "TISU KERING",

"USB" = "KABEL CHARGER",

"THAI TEA" = "TEH",

"THE PUCUK" = "TEH",

"TIC TAC" = "SNACK",

"TISSU" = "TISU KERING",

"TISSUE" = "TISU KERING",
```

```
"TISSUE PASEO" = "TISU KERING",

"TISU" = "TISU KERING",

"TOBLERONE" = "COKLAT",

"TOFU" = "TAHU",

"TOLAK ANGIN" = "MINUMAN KESEHATAN",

"TOP COFFE" = "KOPI",

"TOPPOKI INSTAN" = "MAKANAN KOREA",

"TRASH BAG" = "PLASTIK",

"TTEOK" = "MAKANAN KOREA",

"TTEOKBOKI" = "MAKANAN KOREA",

"TWISTKO" = "SNACK",

"UHT" = "SUSU",

"ULTRA MILK" = "SUSU",

"ULTRA STRAWBERRY" = "SUSU",

"ULTRAMILK" = "SUSU",

"VIDORAN" = "VITAMIN",

"VITAMIN D" = "VITAMIN",

"VITAMIN RAMBUT" = "VITAMIN",

"WALLS ICE CREAM" = "ES KRIM",

"WDANK" = "MINUMAN KESEHATAN",

"WHISKAS MAKANAN KUCING" = "MAKANAN KUCING",

"YAKULT" = "MINUMAN KESEHATAN",

"YAKULT CITRUN" = "MINUMAN KESEHATAN",
```

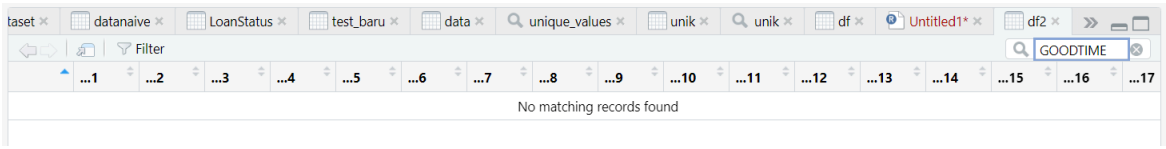
```
"YC1000" = "MINUMAN KESEHATAN",

"YOGHURT CIMORY" = "YOGHURT",

"YOGURT BLUBERRY" = "YOGHURT",

"YOGURT BLUEBERRY" = "YOGHURT",

"YOGURT STROBERRY" = "YOGHURT",

"YOHURT" = "YOGHURT",

"YOU-C 1000" = "MINUMAN KESEHATAN",

"YUPI" = "PERMEN",

"YUPI LITTLE STARS" = "PERMEN",

"ZEE" = "SUSU",

"MINUMANA THAILAND" = "MINUMAN THAILAND",

"MIS INSTAN" = "MIE INSTAN",

"NASI SEGITIGA MAYO (2)" = "ONIGIRI",

"Nestlé Pure Life" = "AIR MINERAL BOTOL",

"NUGGET AYAM" = "NUGGET",

"NUTRIBOOST" = "MINUMAN",

"NUTRIJEL" = "AGAR-AGAR",

"NUTRISARI" = "MINUMAN",

"ODOL" = "PASTA GIGI",

"PILUS GARUDA" = "KACANG",

"POCARI SWEAT" = "MINUMAN ISOTONIK",

"POPOK BAYI" = "POPOK",

"PRINGLES ORGINAL" = "SNACK",
```

```
"PULPEN FABER CASTELL" = "PULPEN",

"ROMA MALKIST" = "BISKUIT",

"SABUN" = "SABUN MANDI",

"SABUN CUCI" = "SABUN CUCI PIRING",

"SABUN MANDI LIFEBUOY" = "SABUN MANDI",

"SALMON BALL" = "MAKANAN JEPANG",

"SELAI STRAWBERRY" = "SELAI",

"SPONS CUCI PIRING SCOTCH-BRITE" = "SPONS",

"STTRAWBERRY LUCKY SUNDAE" = "ES KRIM",

"STICK KEPITING," = "MAKANAN JEPANG",

"SUP INSTAN" = "SUP",

"TEH TONG TJI" = "TEH",

"TESSA TISSUE" = "TISU KERING",

"WAGON CONTAINER BOX" = "BOX",

"WALLS" = "ES KRIM",

"YOGURT" = "YOGHURT",

"ZUPPA SOUP" = "SUP",

"ADEMSARI" = "MINUMAN KESEHATAN",

"AQUA" = "AIR MINERAL BOTOL",

"BASO" = "BAKSO",

"BOLEN LILIT COKLAT" = "KUE",

"BUSKUIT" = "BISKUIT",

"CHIKUWA" = "MAKANAN JEPANG",
```

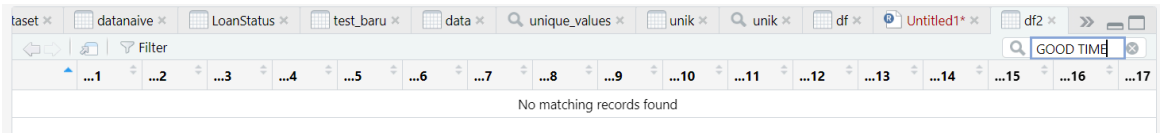
```
"COOKIE" = "BISKUIT",

"CUP" = "GELAS",

"DEODIRAN TELUR KECAP BUAH ROTI KAPAS" = "DEODORANT",

"DETERJEN" = "SABUN CUCI PAKAIAN",

"DUMPLING" = "MAKANAN TIONGKOK",

"HAIR TONIC" = "PERAWATAN RAMBUT",

"HIT" = "OBAT NYAMUK",

"HYDRO COCO" = "MINUMAN BUAH",

"KOPI GOODDAY" = "KOPI",

"KOPI KAPAL API" = "KOPI",

"LUWAK WHITE KOFFE" = "KOPI",

"LYCHEE" = "LECI",

"MAICIH" = "KERIPIK",

"MENTOS MINT" = "PERMEN",

"MIE INSTANT" = "MIE INSTAN",

"BRONDONG JAGUNG" = "POPCORN",

"GULA" = "GULA PUTIH",

"KABEL CHARGER TYPE C" = "KABEL CHARGER",

"KABEL USB" = "KABEL CHARGER",

"KECAP" = "KECAP MANIS",

"KERIPIK PISANG" = "KERIPIK",

"MASKER WAJAH GARNIER" = "MASKER WAJAH",

"SABUN MANDI LIFEBOUY" = "SABUN MANDI",
```

```
  "PRINGLES ORIGINAL" = "SNACK",

  "BUMBU" = "BUMBU INSTAN"

)




# menggunakan mapping value untuk mengubah

df2  <-  data.frame(lapply(df2,  function(x)  mapvalues(x,  from  =
names(mapping), to = mapping)))


View(df2)
```

Memeriksa item yang sekiranya sama, contohnya GOODTIME dan GOOD TIME yang keduanya merupakan BISKUIT.



Gambar 4.3 Memeriksa Item GOODTIME

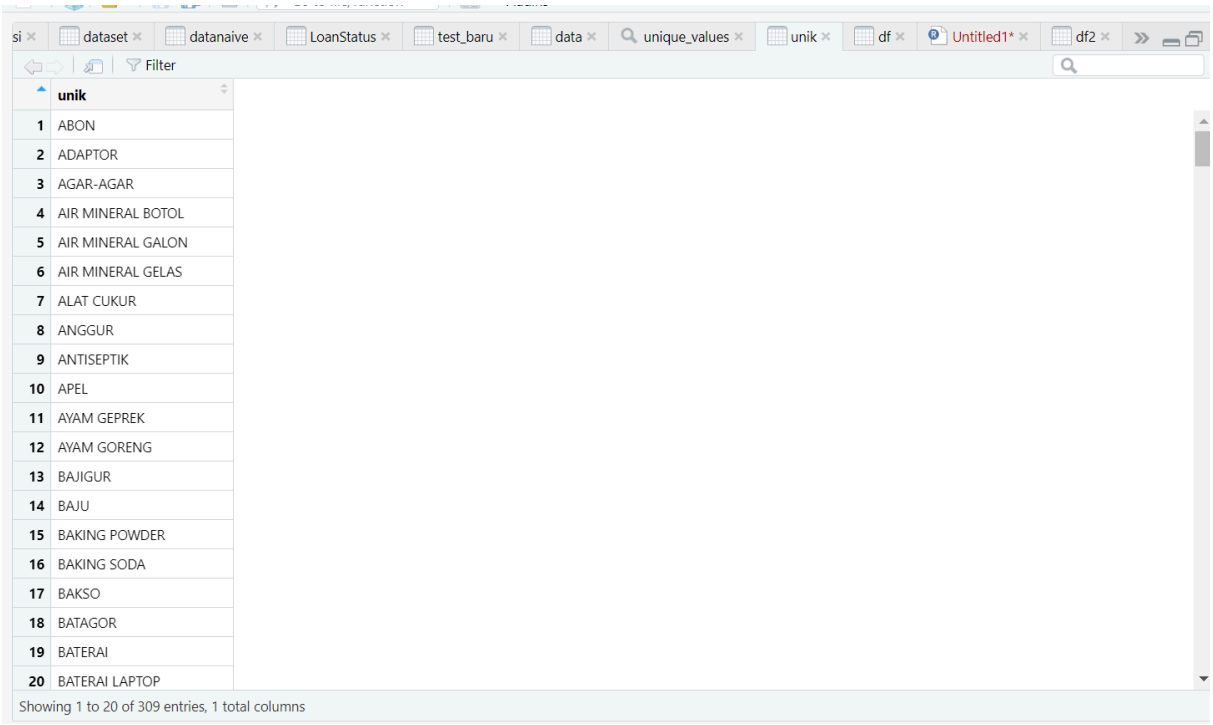


Gambar 4.4 Memeriksa Item GOOD TIME

Memeriksa kembali item yang unik untuk kedua kali.

```
# Mengumpulkan nilai unik dari semua kolom dan menggabungkannya
menjadi satu vektor
```

```r
unique_values <- unique(unlist(df2))



# menghilangkan data yg NA

unik <- na.omit(unique_values)

unik <- sort(unik)



#Ubah menjadi data frame agar mudah dilihat

unik <- data.frame(unik)

View(unik)
```



Gambar 4.5 Memeriksa Item Unik Kedua Kali

Sebelumnya data unik terdapat 946 berubah menjadi 309

Menggabungkan data dari berbagai kolom menjadi 1 kolom

```r
# Fungsi untuk menyatukan nilai-nilai dari setiap baris dengan koma di antaranya

df2$Items <- apply(df2, 1, function(row) {

  non_null_values <- row[!is.na(row)]

  if (length(non_null_values) > 0) {

    paste(non_null_values, collapse = ", ")

  } else {

    NA

  }

})



# Print hasil

df2 <- df2[, "Items", drop = FALSE]

df2 <- na.omit(df2) # menghilangkan baris yang ada nullnya

View(df2)
```

df2 × | unique_values × | df × | unik × | UAS.R* × | df2_filtered × | transactions × | df_clean × | head(train_data) ×

Filter

	Items
1	SHAMPO, SABUN MANDI
2	PERMEN
3	REPELLANT NYAMUK, TISU KERING, PERMEN
4	LOTION, GULA DIABET, KAMPER
5	ROTI
6	SAOS TOMAT
7	SAOS TIRAM, SAOS SAMBAL, SAOS TOMAT
8	MINYAK GORENG, AGAR-AGAR
9	ROTI, MARGARIN, PERMEN, MESES

Showing 1 to 9 of 996 entries, 1 total columns

Gambar 4.6 Memeriksa df yang Telah Digabung Menjadi 1 Kolom

Menghapus baris yang terdapat item yang NA atau NULL

```
df2 <- na.omit(df2) #menghilangkan baris yang ada nullnya
```

Selanjutnya mengubah data frame menjadi list transaksi.

```
# Split the Items into a list of transactions

transactions <- strsplit(as.character(df2$Items), ", ")
```

Mengubah list transaksi menjadi matriks binary.

```
# Convert to a binary matrix (transaction vs. item)

transaction_matrix <- as(transactions, "transactions")
```

Memeriksa hasil dari matriks binary.

```
# Inspect the resulting binary matrix

inspect(transaction_matrix)
```

```
[990] {CCTV,
       LAPTOP,
       SPEAKER,
       TINTA}
[991] {MOUSE,
       RAM,
       TINTA}
[992] {KABEL CHARGER,
       KEYBOARD,
       MONITOR,
       MOUSE PAD}
[993] {ADAPTOR,
       KABEL HDMI,
       LAPTOP}
[994] {KEYBOARD,
       MOUSE,
       MOUSE PAD}
[995] {KABEL CHARGER,
       MOUSE,
       SPEAKER,
       TINTA}
[996] {MONITOR,
       MOUSE PAD,
       SPEAKER}
```

Gambar 4.7 Hasil Inspect transaction_matrix

Membuat model menggunakan algoritma apriori.

```
model1 <- apriori(transaction_matrix, minlen=3, parameter =
list(support = 0.005, confidence = 0.005))

print(length(model1))

inspect(sort(model1, by = 'lift'))
```

Parameter yang digunakan yaitu support = 0,005, confidence = 0,005

```
> model1 <- apriori(transaction_matrix, minlen=3, parameter = list(support = 0.005, confidence = 0.005))
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
      0.005    0.1    1 none FALSE            TRUE       5   0.005      3     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 4

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[309 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [105 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 done [0.00s].
writing ... [75 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 4.8 Output dari Pembuatan Model dengan Algoritma Apriori [1]

```
> print(length(model1))
[1] 75
> inspect(sort(model1, by = 'lift'))
     lhs                                        rhs                  support     confidence coverage
[1]  {GULA PUTIH, PENYEDAP RASA}             => {GARAM}              0.005020080 1.0000000  0.005020080
[2]  {GARAM, PENYEDAP RASA}                  => {GULA PUTIH}         0.005020080 0.8333333  0.006024096
[3]  {GARAM, GULA PUTIH}                     => {PENYEDAP RASA}      0.005020080 1.0000000  0.005020080
[4]  {MIE INSTAN, SAOS SAMBAL}               => {KECAP MANIS}        0.006024096 0.6000000  0.010040161
[5]  {SABUN CUCI PAKAIAN, SABUN CUCI PIRING} => {PEWANGI PAKAIAN}    0.005020080 0.5555556  0.009036145
[6]  {SHAMPO, SIKAT GIGI}                    => {SABUN MANDI}        0.006024096 1.0000000  0.006024096
[7]  {SABUN MANDI, SIKAT GIGI}               => {SHAMPO}             0.006024096 0.6666667  0.009036145
[8]  {PASTA GIGI, SHAMPO}                    => {SABUN MANDI}        0.008032129 0.8888889  0.009036145
[9]  {PEWANGI PAKAIAN, SABUN CUCI PIRING}    => {SABUN CUCI PAKAIAN} 0.005020080 0.7142857  0.007028112
[10] {KECAP MANIS, MIE INSTAN}               => {SAOS SAMBAL}        0.006024096 0.6666667  0.009036145
[11] {PEWANGI PAKAIAN, SABUN CUCI PAKAIAN}   => {SABUN CUCI PIRING}  0.005020080 0.5000000  0.010040161
[12] {PASTA GIGI, SABUN MANDI}               => {SHAMPO}             0.008032129 0.5333333  0.015060241
[13] {SABUN MANDI, SIKAT GIGI}               => {PASTA GIGI}         0.005020080 0.5555556  0.009036145
[14] {PASTA GIGI, SABUN MANDI}               => {SIKAT GIGI}         0.005020080 0.3333333  0.015060241
[15] {SABUN MANDI, SHAMPO}                   => {SIKAT GIGI}         0.006024096 0.3157895  0.019076305
[16] {MIE INSTAN, TELUR}                     => {KECAP MANIS}        0.005020080 0.2941176  0.017068273
[17] {SABUN MANDI, SHAMPO}                   => {PASTA GIGI}         0.008032129 0.4210526  0.019076305
[18] {PASTA GIGI, SIKAT GIGI}                => {SABUN MANDI}        0.005020080 0.4545455  0.011044177
[19] {MIE INSTAN, MINYAK GORENG}             => {TELUR}              0.005020080 0.6250000  0.008032129
[20] {KECAP MANIS, MIE INSTAN}               => {TELUR}              0.005020080 0.5555556  0.009036145
[21] {MIE INSTAN, TELUR}                     => {SAOS SAMBAL}        0.005020080 0.2941176  0.017068273
[22] {MIE INSTAN, SAOS SAMBAL}               => {TELUR}              0.005020080 0.5000000  0.010040161
[23] {SAOS SAMBAL, TELUR}                    => {MIE INSTAN}         0.005020080 1.0000000  0.005020080
[24] {MIE INSTAN, TELUR}                     => {MINYAK GORENG}      0.005020080 0.2941176  0.017068273
[25] {KOPI, MIE INSTAN}                      => {SABUN CUCI PAKAIAN} 0.005020080 0.2000000  0.025100402
```

Gambar 4.9 Output dari Pembuatan Model dengan Algoritma Apriori [2]

```
      lift       count
[1]  124.500000 5
[2]   51.875000 5
[3]   45.272727 5
[4]   27.163636 6
[5]   26.349206 5
[6]   24.292683 6
[7]   22.133333 6
[8]   21.593496 8
[9]   20.924370 5
[10]  20.750000 6
[11]  19.153846 5
[12]  17.706667 8
[13]  16.767677 5
[14]  16.600000 5
[15]  15.726316 6
[16]  13.315508 5
[17]  12.708134 8
[18]  11.042129 5
[19]  10.921053 5
[20]   9.707602 5
[21]   9.154412 5
[22]   8.736842 5
[23]   7.545455 5
[24]   7.323529 5
[25]   5.858824 5
[26]   5.659091 6
[27]   4.776978 6
```

Gambar 4.10 Output dari Pembuatan Model dengan Algoritma Apriori [3]

```
> summary(model1)
set of 75 rules

rule length distribution (lhs + rhs):sizes
 3
75

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      3       3       3       3       3       3

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.005020   Min.   :0.1562   Min.   :0.005020   Min.   :  1.255   Min.   :5.00
 1st Qu.:0.005020   1st Qu.:0.2500   1st Qu.:0.009036   1st Qu.:  2.227   1st Qu.:5.00
 Median :0.005020   Median :0.3500   Median :0.016064   Median :  3.166   Median :5.00
 Mean   :0.005582   Mean   :0.4308   Mean   :0.016640   Mean   :  9.382   Mean   :5.56
 3rd Qu.:0.006024   3rd Qu.:0.5556   3rd Qu.:0.025100   3rd Qu.: 10.314   3rd Qu.:6.00
 Max.   :0.008032   Max.   :1.0000   Max.   :0.032129   Max.   :124.500   Max.   :8.00

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.005      0.005
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(support = 0.005, confidence = 0.005), minlen = 3)
```

Gambar 4.11 Output dari Pembuatan Model dengan Algoritma Apriori [4]

Membuat data frame *df_label* yang berisi label aturan asosiasi dari model1 yang diurutkan berdasarkan nilai 'lift'.

```
df_label <- data.frame( Items = labels(sort(model1, by = 'lift')))
```

Membersihkan whitespace pada kedua kolom.

```
 # Membersihkan whitespace pada kedua kolom

output_data$Items <- trimws(output_data$Items)

output_data$Output <- trimws(output_data$Output)
```

Menggunakan fungsi gsub dalam bahasa pemrograman R untuk menggantikan setiap karakter { dan } dengan string kosong ("") pada setiap elemen kolom dari data frame output_data menggunakan fungsi lapply.

```
output_data[] <- lapply(output_data, function(x) gsub("[{}]", "", x))
```

Menampilkan hasil.

```
# Menampilkan hasil

df_label <- output_data
```

Membuat fungsi untuk memprediksi kemungkinan rekomendasi item transaksi.

```
# Definisi fungsi untuk memprediksi kemungkinan rekomendasi item transaksi

predict_output_all <- function(new_items, df_label) {
```

```
  # Mengonversi setiap elemen input menjadi pola regex dan membuat regex yang memuat semua elemen
  regex_pattern <- paste0(".*", paste(new_items, collapse = ".*"), ".*")

  # Mencocokkan pola regex di dalam kolom df_label$Items
  match_rows <- grepl(regex_pattern, df_label$Items)

  # Jika setidaknya satu baris cocok, mengembalikan output dalam format vektor
  if (any(match_rows)) {
    output <- unique(df_label$Output[match_rows])
    formatted_output <- paste("[", seq_along(output), "] ", output, collapse = "\n")
    return(formatted_output)
  } else {
    return("Pola input tidak cocok dengan data")
  }
}
```

Melakukan percobaan prediksi untuk item yang diinput.

```
# Contoh penggunaan fungsi dengan input
input <- c("SUSU”)
cat(predict_output_all(input, df_label))
```

```
> input <- c("SUSU")
> cat(predict_output_all(input, df_label))
[ 1 ]  SNACK
[ 2 ]  AIR MINERAL BOTOL
[ 3 ]  MIE INSTAN
[ 4 ]  PERMEN
[ 5 ]  KOPI
```

Gambar 4.12 Output dari Prediksi Rekomendasi Item untuk SUSU

5. Experiment

a. Data Fitting

Membuat model sebanyak 20.

```
model1 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.7)) #Percobaan = Rules

model2 <- apriori(transaction_matrix, minlen=3, parameter = list(support = 0.005, confidence = 0.005)) #Percobaan = Rules

model3 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.005, confidence = 0.005)) #Percobaan = Rules

model4 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.7)) #Percobaan = Rules

model5 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.8)) #Percobaan = Rules

model6 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.9)) #Percobaan = Rules

model7 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.004, confidence = 0.8)) #Percobaan = Rules
```

```
model8    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.004, confidence = 0.6)) #Percobaan =
Rules

model9    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.004, confidence = 0.5)) #Percobaan =
Rules

model10    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.001, confidence = 0.7)) #Percobaan =
Rules

model11    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.001, confidence = 0.8)) #Percobaan =
Rules

model12    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.002, confidence = 0.6)) #Percobaan =
Rules

model13    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.002, confidence = 0.5)) #Percobaan =
Rules

model14    <-    apriori(transaction_matrix,    parameter    =
list(minlen=3,support = 0.003, confidence = 0.7)) #Percobaan =
Rules

model15    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.001, confidence = 0.6)) #Percobaan =
Rules

model16    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.002, confidence = 0.9)) #Percobaan =
Rules

model17    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.001, confidence = 0.5)) #Percobaan =
Rules

model18    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.001, confidence = 0.4)) #Percobaan =
Rules
```

```
model19    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.002, confidence = 0.8)) #Percobaan =
Rules

model20    <-    apriori(transaction_matrix,    parameter    =
list(minlen=2,support = 0.002, confidence = 0.4)) #Percobaan =
Rules
```

Mesin untuk menampilkan hasil model, plot, fungsi untuk memprediksi serta menampilkan hasil prediksinya. Untuk mencoba tiap model tinggal mengubah variabel model1 pada mesin tersebut sesuai dengan model yang akan diuji.

```
#Menamapilkan hasil model

print(length(model1))

inspect(sort(model1[1:10], by = 'lift'))

summary(model1)



#Menampilkan Plot

plot(sort(model1,by="lift"),method="graph",control=list(type="
items"))

plot(model1, method = "grouped", control = list(k = 5))

plot(sort(model1[1:50], by = 'lift'), method="paracoord")

plot(sort(model1, jitter=0))



#Mengambil label dari model dan di sorting berdasarkan lift
tertinggi

df_label   <-   data.frame(   Items   =   labels(sort(model1,   by
='coverage')))



#Untuk memisahkan lhs dan rhs
```

```r
output_data <- separate(df_label, Items, into = c("Items", "Output"), sep = "=>")


#Membersihkan whitespace pada kedua kolom

output_data$Items <- trimws(output_data$Items)

output_data$Output <- trimws(output_data$Output)

output_data[] <- lapply(output_data, function(x) gsub("[{}]", "", x))

df_label <- output_data




# dftest <- lapply(dftest$items, function(x) as.list(x))


inputTest <- c("KEJU")


# Filter rules based on lhs present in inputTest

subset_rules <- subset(model1, subset = lhs %in% inputTest)


# Filter rekomendasi yang tidak ada di dalam inputTest

rekomendasi <- unique(labels(rhs(subset_rules)))

rekomendasi <- gsub("[{}]", "", rekomendasi)

rekomendasi <- setdiff(rekomendasi, inputTest)


# Tampilkan hasil rekomendasi final

print(rekomendasi)
```

1.) Percobaan Pertama

Membuat model dengan parameter minlen = 2, support = 0.002, confident = 0.7. Hasilnya 625 rules.

```
> model1 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.7)) #Percobaa
n = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.7    0.1    1 none FALSE            TRUE       5   0.002      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 1

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [192 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 done [0.03s].
writing ... [625 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.1 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model1))
[1] 625
> inspect(sort(model1[1:10], by = 'lift'))
     lhs                     rhs             support     confidence coverage    lift       count
[1]  {BAWANG PUTIH}      => {BAWANG MERAH}  0.002008032 1.0        0.002008032 249.000000 2
[2]  {PEPAYA}            => {NUGGET}        0.002008032 1.0        0.002008032  90.545455 2
[3]  {NASI}              => {AYAM GORENG}   0.002008032 1.0        0.002008032  76.615385 2
[4]  {TEPUNG MAIZENA}    => {TEPUNG TERIGU} 0.002008032 1.0        0.002008032  71.142857 2
[5]  {BATERAI LAPTOP}    => {MOUSE}         0.004016064 0.8        0.005020080  49.800000 4
[6]  {REPELLANT NYAMUK}  => {TISU KERING}   0.002008032 1.0        0.002008032  26.918919 2
[7]  {BATAGOR}           => {TEH}           0.002008032 1.0        0.002008032   7.377778 2
[8]  {PIR}               => {SUSU}          0.002008032 1.0        0.002008032   7.165468 2
[9]  {TEPUNG SERBAGUNA}  => {SNACK}         0.002008032 1.0        0.002008032   5.858824 2
[10] {SIRUP}             => {SUSU}          0.004016064 0.8        0.005020080   5.732374 4
```

Gambar 5.2 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

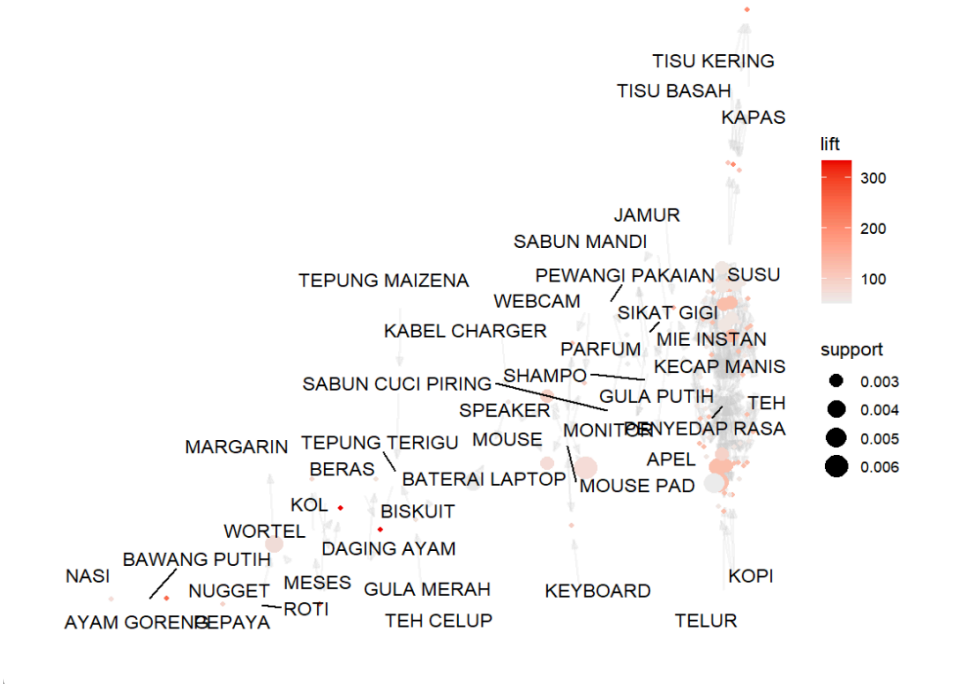
```
> summary(model1)
set of 625 rules

rule length distribution (lhs + rhs):sizes
  2   3   4   5   6
 20 192 285 112  16

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   4.000   3.859   4.000   6.000

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.002008   Min.   :0.7143   Min.   :0.002008   Min.   :  4.394   Min.   :2.000
 1st Qu.:0.002008   1st Qu.:1.0000   1st Qu.:0.002008   1st Qu.:  7.545   1st Qu.:2.000
 Median :0.002008   Median :1.0000   Median :0.002008   Median : 26.210   Median :2.000
 Mean   :0.002296   Mean   :0.9751   Mean   :0.002410   Mean   : 35.599   Mean   :2.286
 3rd Qu.:0.002008   3rd Qu.:1.0000   3rd Qu.:0.002008   3rd Qu.: 45.273   3rd Qu.:2.000
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :332.000   Max.   :8.000

mining info:
            data ntransactions support confidence
 transaction_matrix           996   0.002        0.7
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.002, confidence = 0.7))
```

Gambar 5.3 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model1,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 43 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.4 Output dari Pembuatan Graph [1]

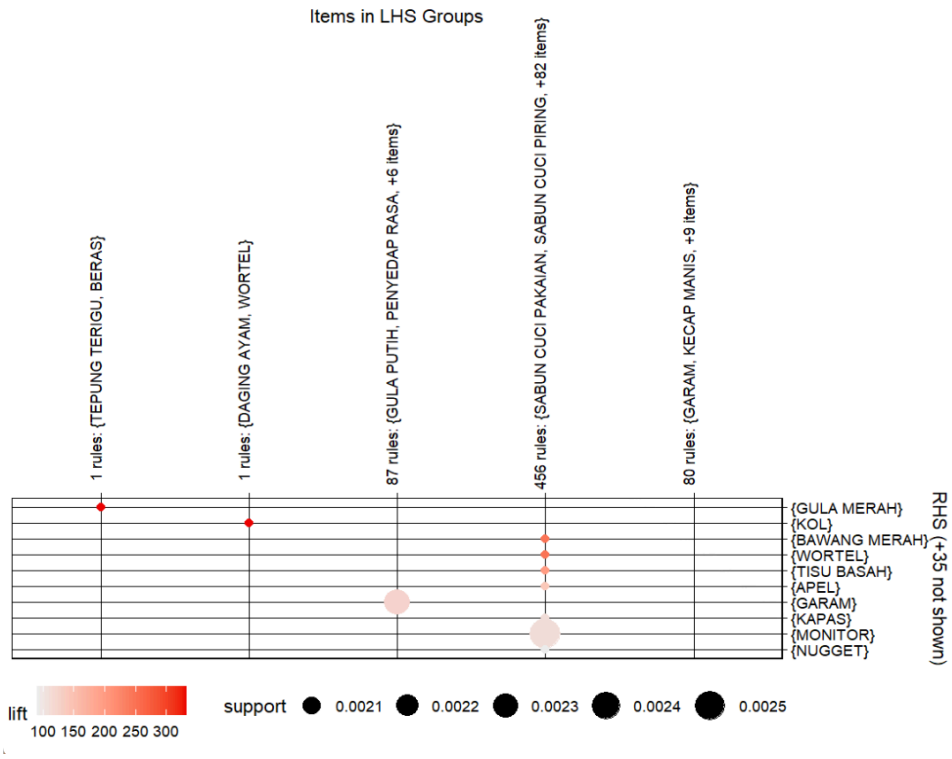


Gambar 5.5 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

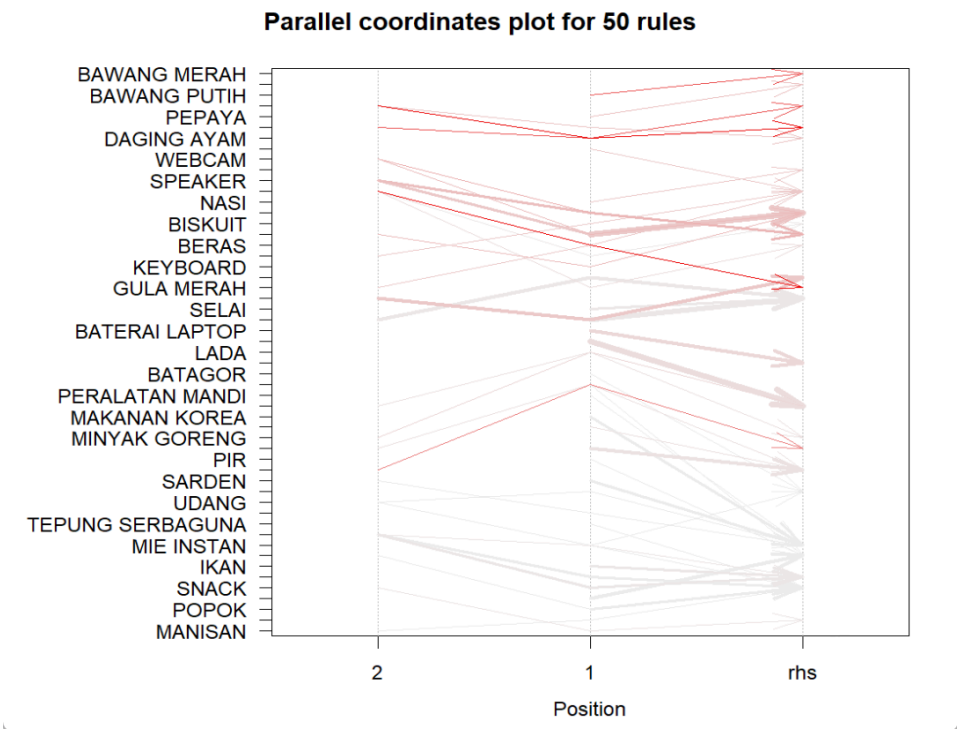
```
> plot(model1, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 38 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 38 unlabeled data points (too many overlaps). Consider increasing max.overlaps
3: ggrepel: 2 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.6 Output dari Pembuatan Plot 5 rules[1]



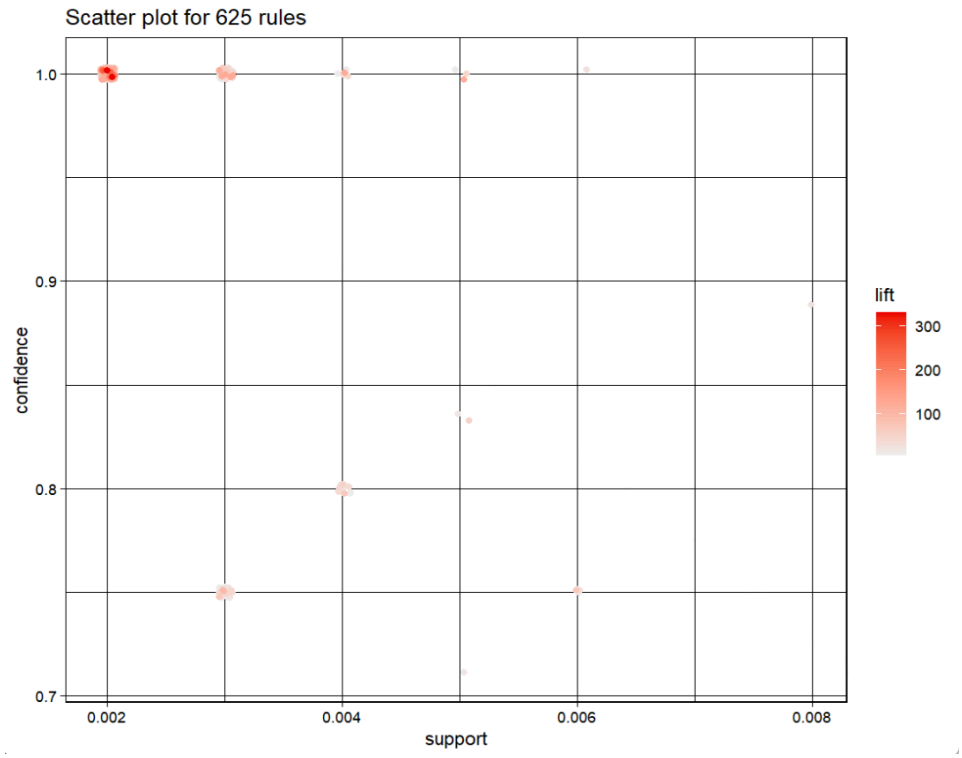
Gambar 5.7 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.8 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.9 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model1, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "SNACK"      "ROTI"       "MIE INSTAN"
```

Gambar 5.10 Hasil Prediksi

2.) Percobaan Kedua

Membuat model dengan parameter minlen = 3, support = 0.005, confident = 0.005. Hasilnya 75 rules.

```
> model2 <- apriori(transaction_matrix, minlen=3, parameter = list(support = 0.005, confidence = 0.005)) #Perco
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
      0.005    0.1    1 none FALSE            TRUE       5   0.005      3     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 4

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [105 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 done [0.00s].
writing ... [75 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.11 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model2))
[1] 75
> inspect(sort(model2[1:10], by = 'lift'))
     lhs                                    rhs                 support     confidence coverage
[1]  {GULA PUTIH, PENYEDAP RASA}         => {GARAM}             0.005020080 1.0000000  0.005020080
[2]  {GARAM, PENYEDAP RASA}              => {GULA PUTIH}        0.005020080 0.8333333  0.006024096
[3]  {GARAM, GULA PUTIH}                 => {PENYEDAP RASA}     0.005020080 1.0000000  0.005020080
[4]  {SHAMPO, SIKAT GIGI}                => {SABUN MANDI}       0.006024096 1.0000000  0.006024096
[5]  {SABUN MANDI, SIKAT GIGI}           => {SHAMPO}            0.006024096 0.6666667  0.009036145
[6]  {PEWANGI PAKAIAN, SABUN CUCI PIRING} => {SABUN CUCI PAKAIAN} 0.005020080 0.7142857  0.007028112
[7]  {SABUN MANDI, SIKAT GIGI}           => {PASTA GIGI}        0.005020080 0.5555556  0.009036145
[8]  {PASTA GIGI, SABUN MANDI}           => {SIKAT GIGI}        0.005020080 0.3333333  0.015060241
[9]  {SABUN MANDI, SHAMPO}               => {SIKAT GIGI}        0.006024096 0.3157895  0.019076305
[10] {PASTA GIGI, SIKAT GIGI}            => {SABUN MANDI}       0.005020080 0.4545455  0.011044177
     lift      count
[1]  124.50000 5
[2]   51.87500 5
[3]   45.27273 5
[4]   24.29268 6
[5]   22.13333 6
[6]   18.72180 5
[7]   16.76768 5
[8]   16.60000 5
[9]   15.72632 6
[10]  11.04213 5
```

Gambar 5.12 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

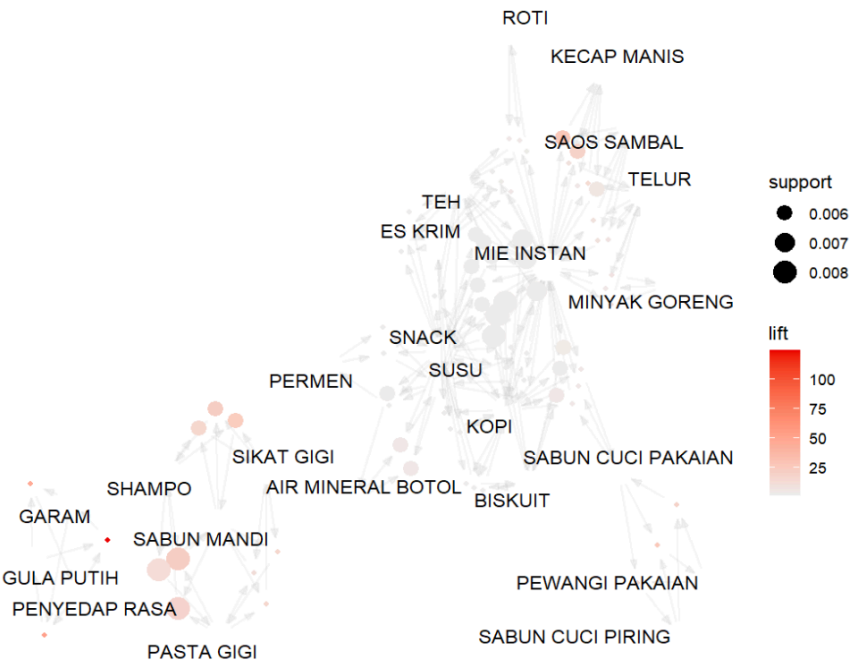
```
> summary(model2)
set of 75 rules

rule length distribution (lhs + rhs):sizes
 3
75

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      3       3       3       3       3       3

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.005020   Min.   :0.1562   Min.   :0.005020   Min.   :  1.302   Min.   :5.00
 1st Qu.:0.005020   1st Qu.:0.2500   1st Qu.:0.009036   1st Qu.:  2.266   1st Qu.:5.00
 Median :0.005020   Median :0.3500   Median :0.016064   Median :  3.354   Median :5.00
 Mean   :0.005582   Mean   :0.4309   Mean   :0.016560   Mean   :  9.339   Mean   :5.56
 3rd Qu.:0.006024   3rd Qu.:0.5556   3rd Qu.:0.025100   3rd Qu.: 10.314   3rd Qu.:6.00
 Max.   :0.008032   Max.   :1.0000   Max.   :0.032129   Max.   :124.500   Max.   :8.00

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.005      0.005
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(support = 0.005, confidence = 0.005), minlen = 3)
```

Gambar 5.13 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model2,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning message:
ggrepel: 21 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.14 Output dari Pembuatan Graph [1]

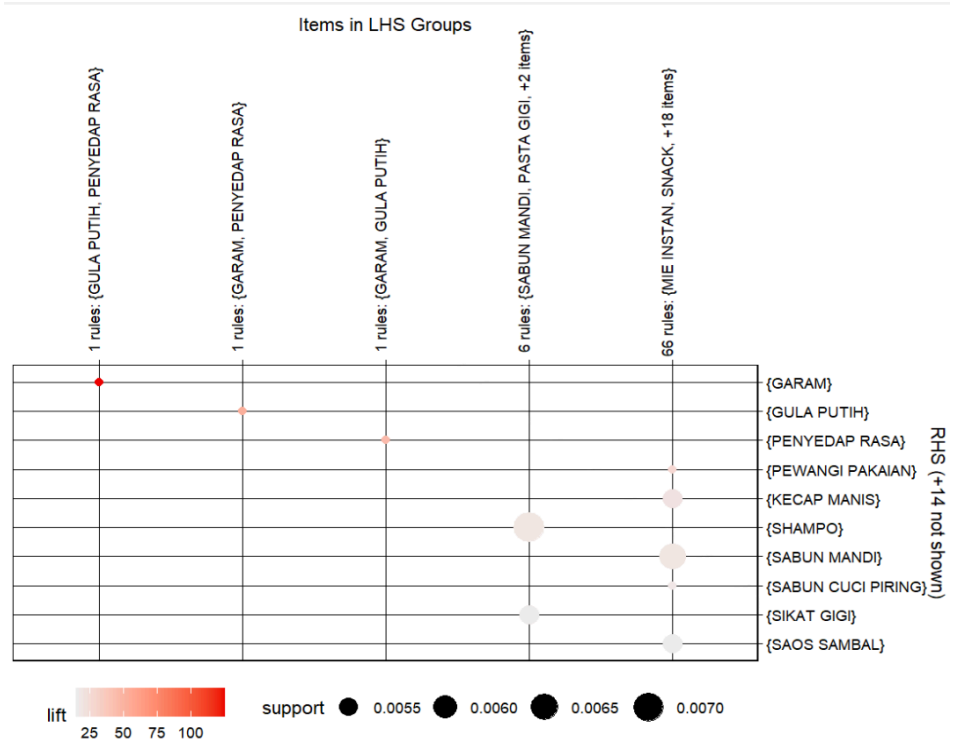


Gambar 5.15 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

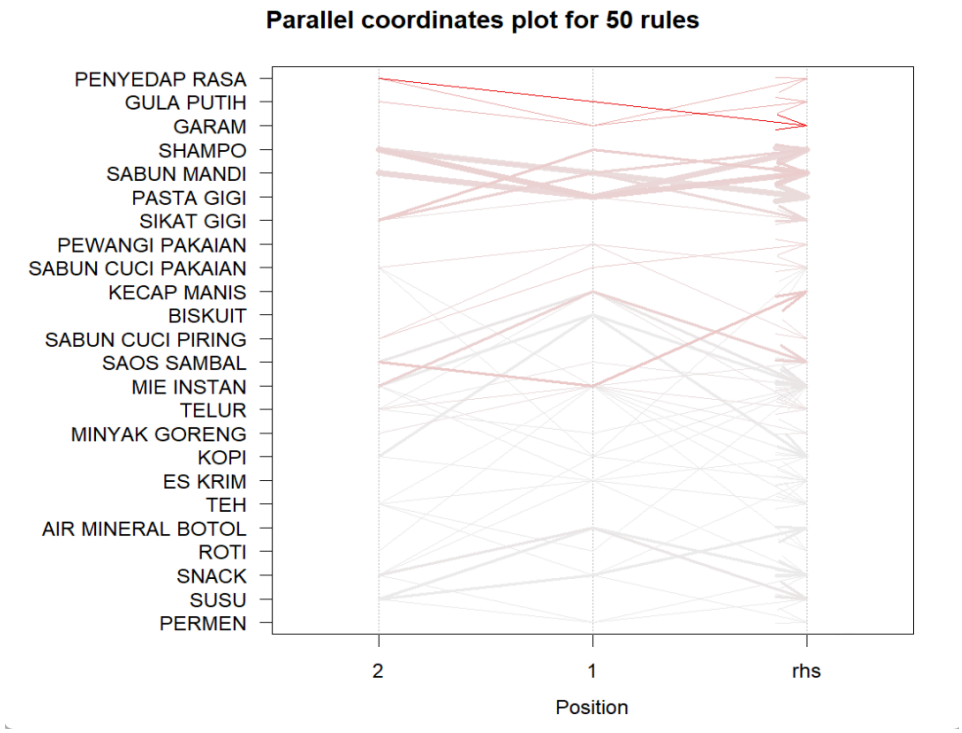
```
> plot(model2, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 2 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 2 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.16 Output dari Pembuatan Plot 5 rules[1]



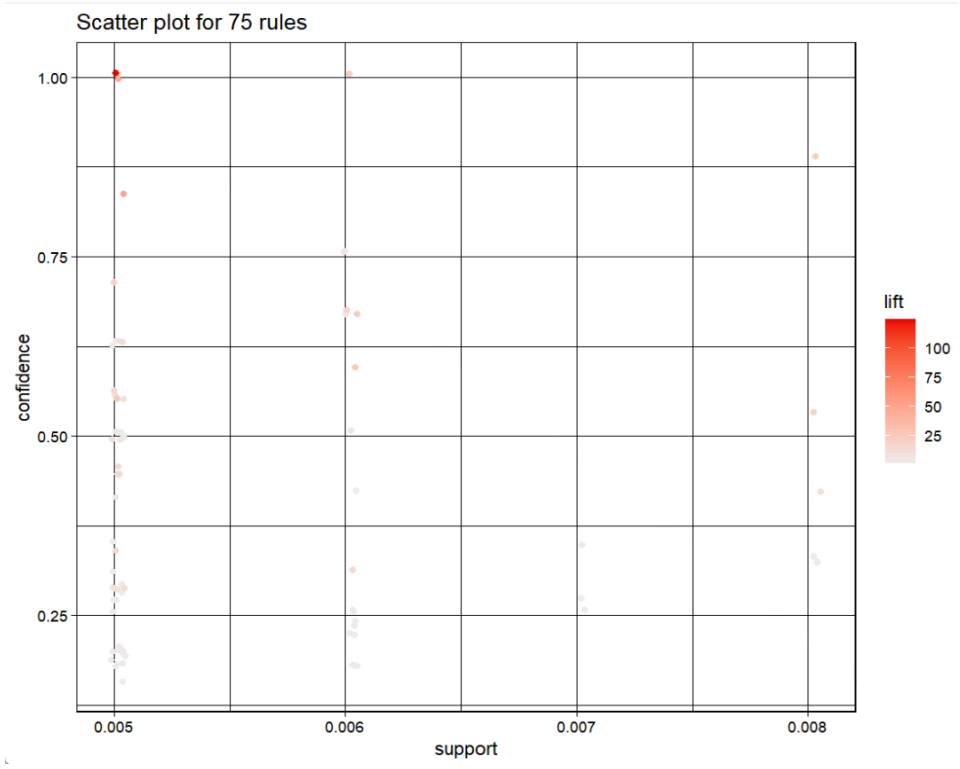
Gambar 5.17 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.18 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.19 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model2, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.20 Hasil Prediksi

3.) Percobaan Ketiga

Membuat model dengan parameter minlen = 2, support = 0.005, confident = 0.005. Hasilnya 355 rules.

```
> model3 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.005, confidence = 0.005)) #P
cobaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
      0.005    0.1    1 none FALSE            TRUE       5   0.005      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 4

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [105 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 done [0.00s].
writing ... [355 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.21 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model3))
[1] 355
> inspect(sort(model3[1:10], by = 'lift'))
     lhs                rhs             support     confidence coverage    lift      count
[1]  {MONITOR}       => {MOUSE PAD}     0.006024096 0.75000000 0.008032129 74.700000 6
[2]  {MOUSE PAD}     => {MONITOR}       0.006024096 0.60000000 0.010040161 74.700000 6
[3]  {KABEL CHARGER} => {MOUSE}         0.005020080 0.50000000 0.010040161 31.125000 5
[4]  {MOUSE}         => {KABEL CHARGER} 0.005020080 0.31250000 0.016064257 31.125000 5
[5]  {ROTI}          => {MESES}         0.005020080 0.08620690 0.058232932 14.310345 5
[6]  {MESES}         => {ROTI}          0.005020080 0.83333333 0.006024096 14.310345 5
[7]  {MARGARIN}      => {ROTI}          0.006024096 0.54545455 0.011044177  9.366771 6
[8]  {ROTI}          => {MARGARIN}      0.006024096 0.10344828 0.058232932  9.366771 6
[9]  {AYAM GORENG}   => {TEH}           0.006024096 0.46153846 0.013052209  3.405128 6
[10] {TEH}           => {AYAM GORENG}   0.006024096 0.04444444 0.135542169  3.405128 6
```

Gambar 5.22 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

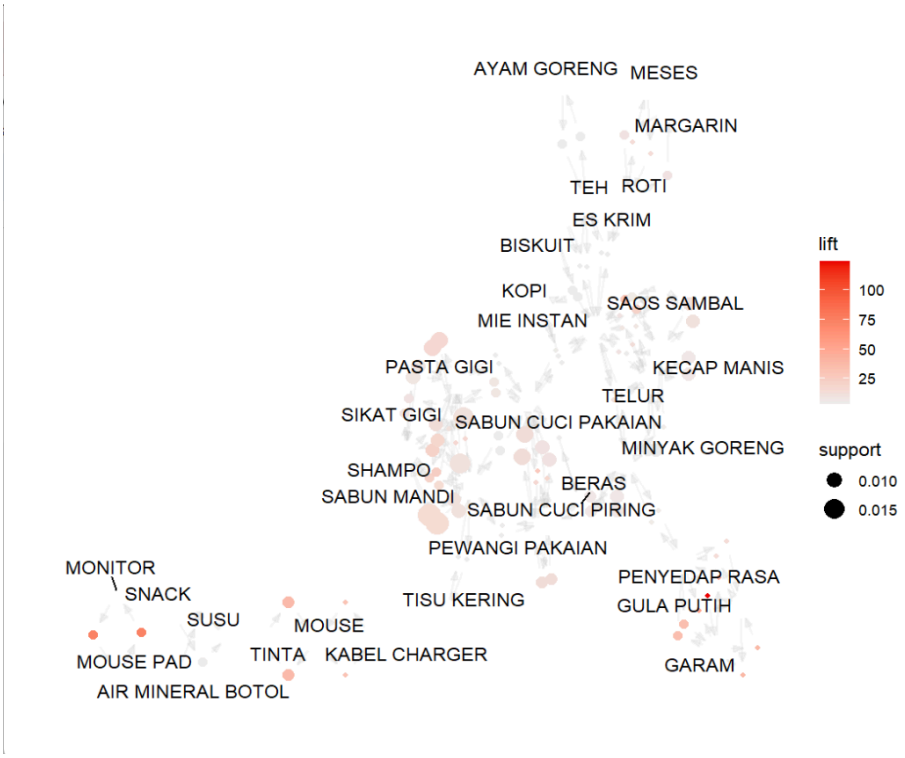
```
> summary(model3)
set of 355 rules

rule length distribution (lhs + rhs):sizes
  2   3
280  75

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   2.000   2.000   2.211   2.000   3.000

summary of quality measures:
    support           confidence        coverage            lift             count
 Min.   :0.005020   Min.   :0.02941   Min.   :0.00502   Min.   :  0.5944   Min.   : 5.000
 1st Qu.:0.005020   1st Qu.:0.09667   1st Qu.:0.02209   1st Qu.:  1.2576   1st Qu.: 5.000
 Median :0.006024   Median :0.17333   Median :0.04016   Median :  1.9479   Median : 6.000
 Mean   :0.008148   Mean   :0.22816   Mean   :0.06548   Mean   :  5.3939   Mean   : 8.115
 3rd Qu.:0.009036   3rd Qu.:0.29412   3rd Qu.:0.12550   3rd Qu.:  3.8042   3rd Qu.: 9.000
 Max.   :0.032129   Max.   :1.00000   Max.   :0.17068   Max.   :124.5000   Max.   :32.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.005      0.005
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.005, confidence = 0.005))
```

Gambar 5.23 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model3,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if neede
d).
2: ggrepel: 30 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.24 Output dari Pembuatan Graph [1]

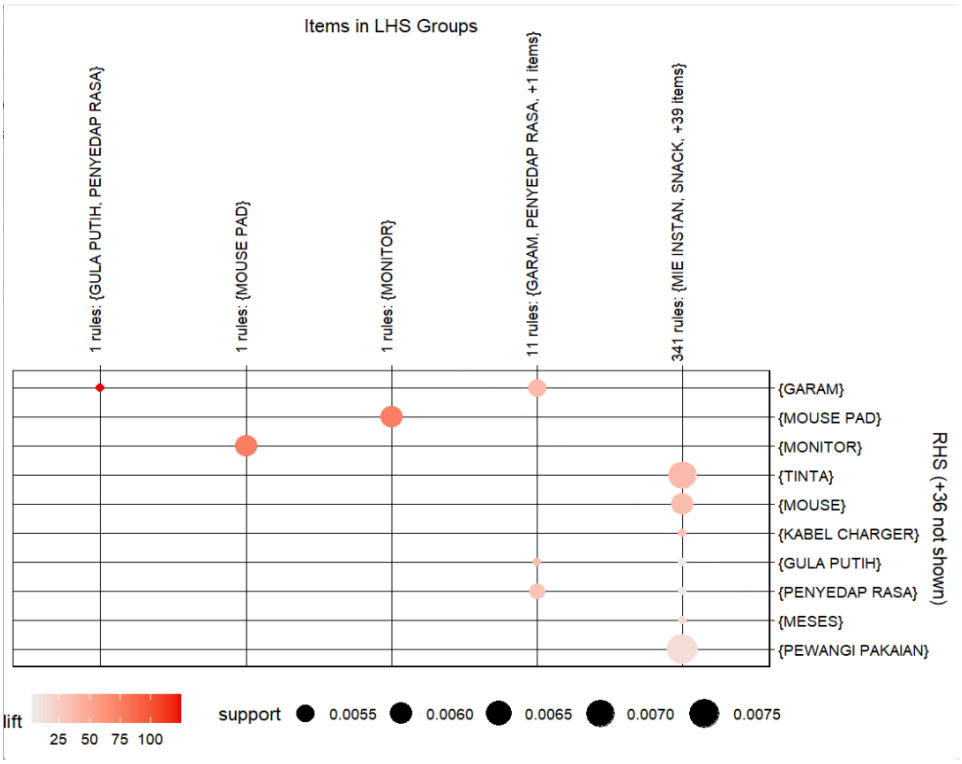


Gambar 5.25 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

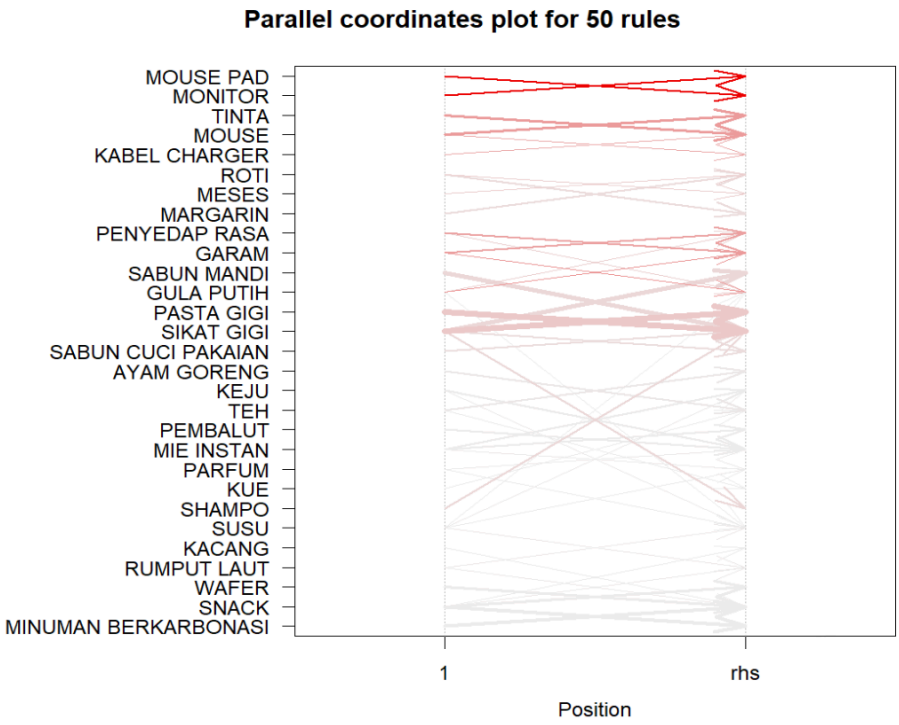
```
> plot(model3, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 10 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 10 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.26 Output dari Pembuatan Plot 5 rules[1]



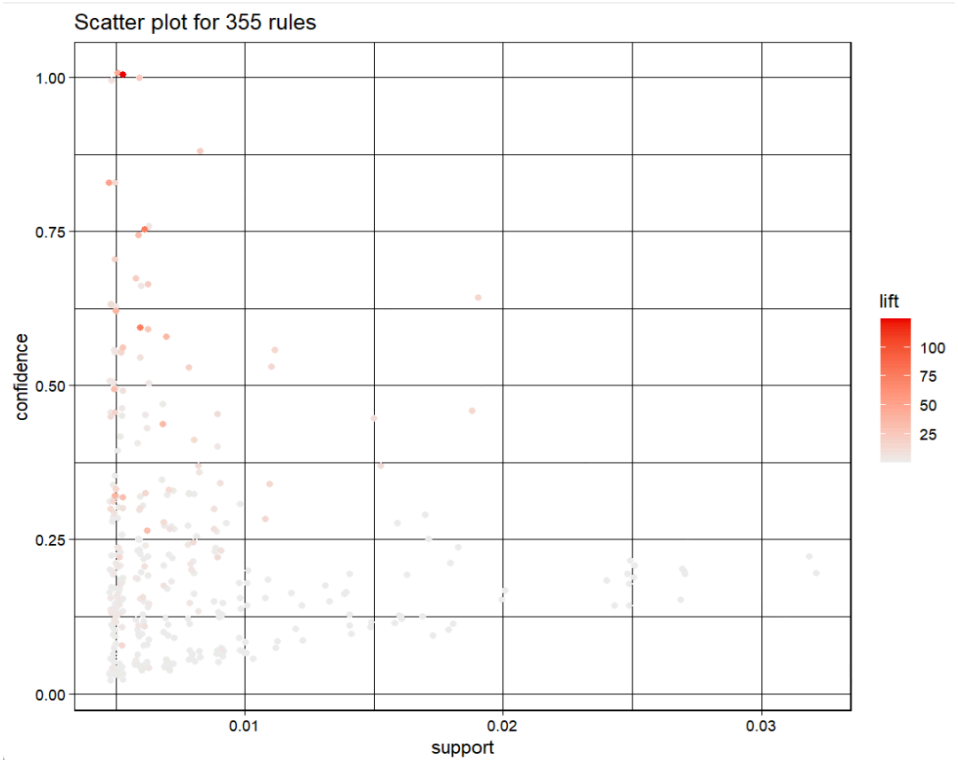
Gambar 5.27 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.28 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.29 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model3, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "SUSU"       "MIE INSTAN"
```

Gambar 5.30 Hasil Prediksi

4.) Percobaan Keempat

Membuat model dengan parameter minlen = 2, support = 0.003, confident = 0.7. Hasilnya 127 rules.

```
> model4 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.7)) #Perco
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.7    0.1    1 none FALSE            TRUE       5   0.003      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 2

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [148 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 done [0.00s].
writing ... [127 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.31 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model4))
[1] 127
> inspect(sort(model4[1:10], by = 'lift'))
     lhs                    rhs           support     confidence coverage    lift      count
[1]  {MONITOR}           => {MOUSE PAD}   0.006024096 0.7500000  0.008032129 74.700000 6
[2]  {BATERAI LAPTOP} => {MOUSE}       0.004016064 0.8000000  0.005020080 49.800000 4
[3]  {TISU BASAH}     => {TISU KERING} 0.004016064 0.8000000  0.005020080 21.535135 4
[4]  {MESES}          => {ROTI}        0.005020080 0.8333333  0.006024096 14.310345 5
[5]  {IKAN}           => {TELUR}       0.003012048 0.7500000  0.004016064 13.105263 3
[6]  {SELAI}          => {ROTI}        0.003012048 0.7500000  0.004016064 12.879310 3
[7]  {SIRUP}          => {SUSU}        0.004016064 0.8000000  0.005020080  5.732374 4
[8]  {MAKANAN KOREA}  => {MIE INSTAN}  0.003012048 0.7500000  0.004016064  5.659091 3
[9]  {SARDEN}         => {MIE INSTAN}  0.003012048 0.7500000  0.004016064  5.659091 3
[10] {POPOK}          => {SNACK}       0.003012048 0.7500000  0.004016064  4.394118 3
```

Gambar 5.32 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

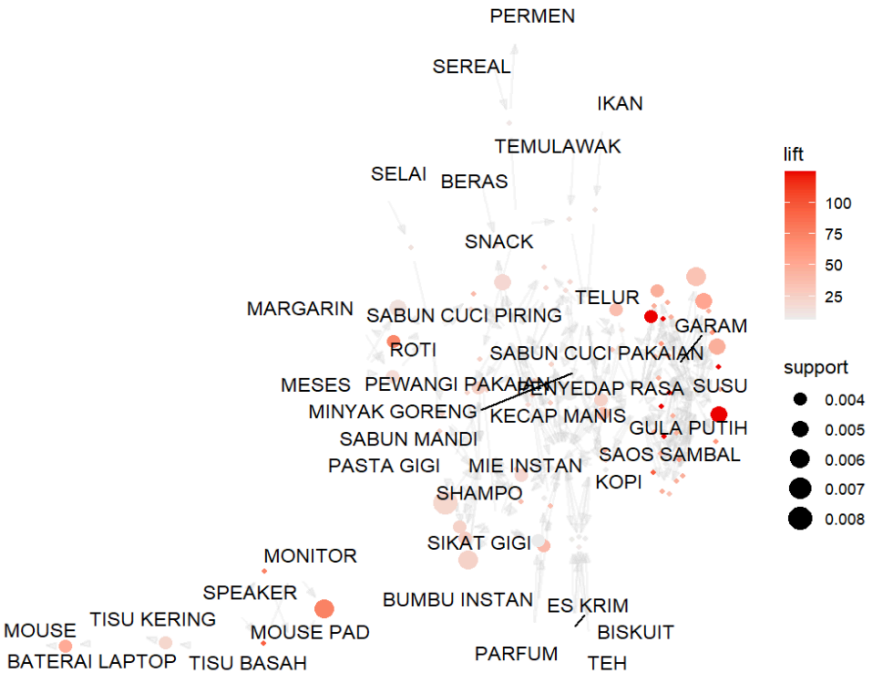
```
> summary(model4)
set of 127 rules

rule length distribution (lhs + rhs):sizes
 2  3  4  5
11 63 48  5

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   2.00    3.00    3.00    3.37    4.00    5.00

summary of quality measures:
    support           confidence        coverage             lift             count
 Min.   :0.003012   Min.   :0.7143   Min.   :0.003012   Min.   :  4.394   Min.   :3.000
 1st Qu.:0.003012   1st Qu.:0.7500   1st Qu.:0.003012   1st Qu.:  7.545   1st Qu.:3.000
 Median :0.003012   Median :0.8333   Median :0.004016   Median : 19.658   Median :3.000
 Mean   :0.003423   Mean   :0.8773   Mean   :0.003984   Mean   : 30.250   Mean   :3.409
 3rd Qu.:0.003514   3rd Qu.:1.0000   3rd Qu.:0.004016   3rd Qu.: 45.273   3rd Qu.:3.500
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :124.500   Max.   :8.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.003        0.7
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.003, confidence = 0.7))
```

Gambar 5.33 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model4,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if neede
d).
2: ggrepel: 36 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.34 Output dari Pembuatan Graph [1]

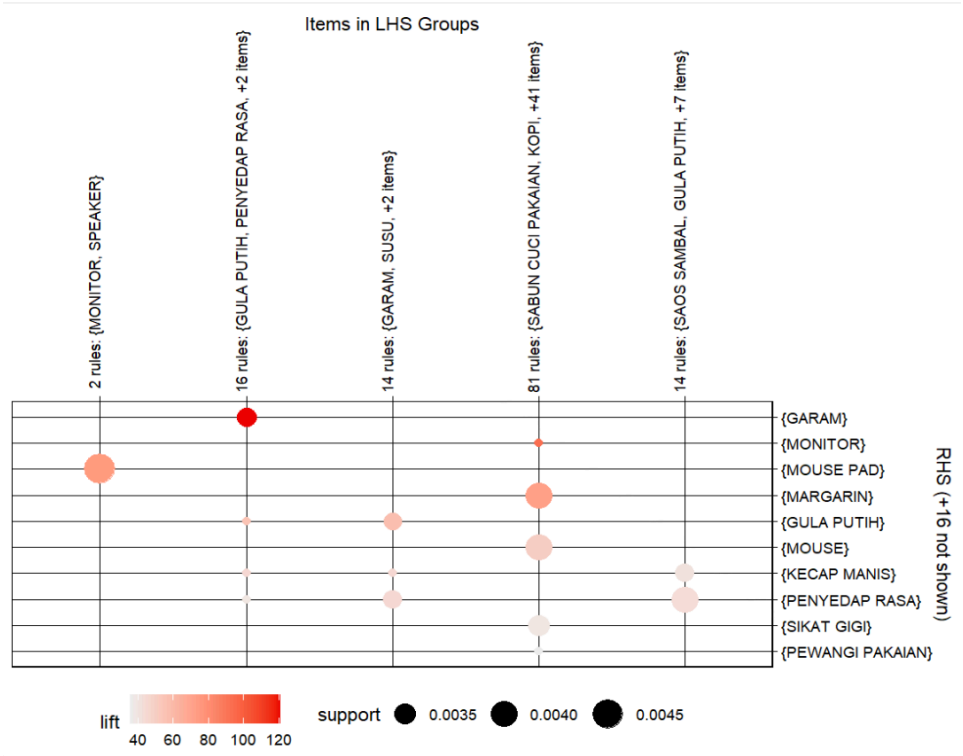


Gambar 5.35 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

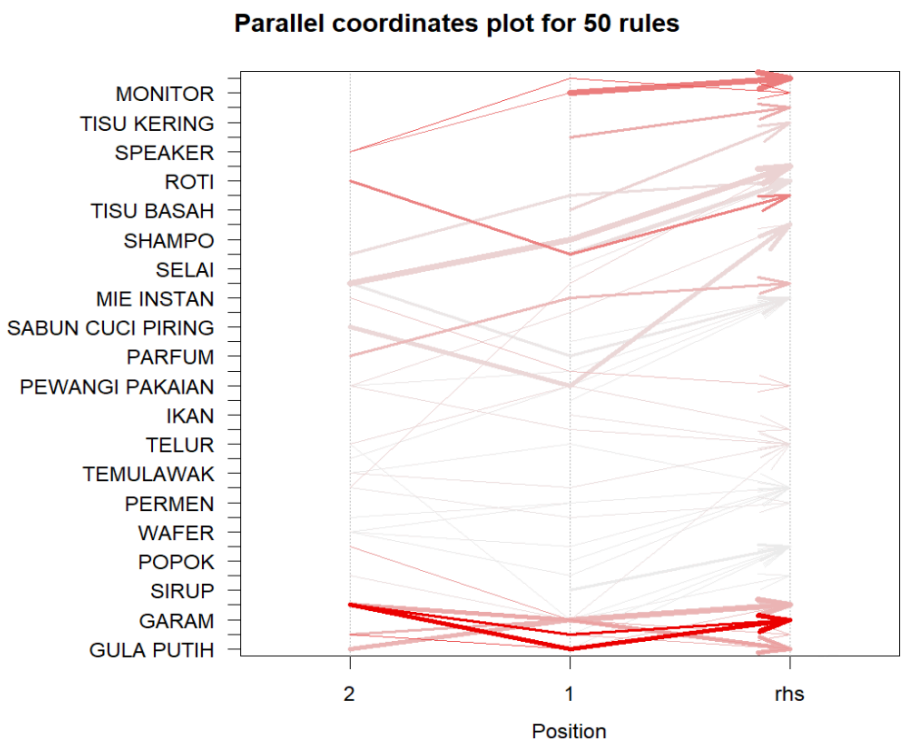
```
> plot(model4, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 28 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 28 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.36 Output dari Pembuatan Plot 5 rules[1]



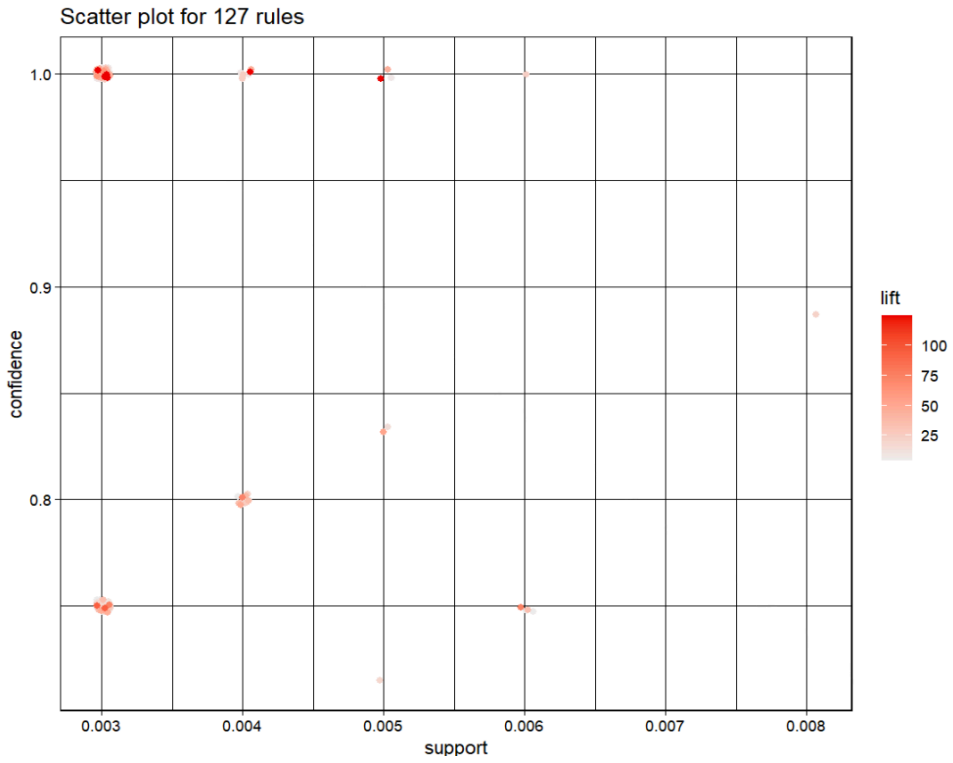
Gambar 5.37 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.38 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.39 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model4, subset = lhs %in% inputTest)
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.40 Hasil Prediksi

5.) Percobaan Kelima

Membuat model dengan parameter minlen = 2, support = 0.003, confident = 0.8. Hasilnya 77 rules.

```
> model5 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.8))
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.8    0.1    1 none FALSE            TRUE       5   0.003      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 2

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [148 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 done [0.00s].
writing ... [77 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.41 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model5))
[1] 77
> inspect(sort(model5[1:10], by = 'lift'))
     lhs                          rhs              support     confidence coverage    lift      count
[1]  {MESES, ROTI}             => {MARGARIN}       0.004016064 0.8000000  0.005020080 72.436364 4
[2]  {GARAM, PENYEDAP RASA}    => {GULA PUTIH}     0.005020080 0.8333333  0.006024096 51.875000 5
[3]  {BATERAI LAPTOP}          => {MOUSE}          0.004016064 0.8000000  0.005020080 49.800000 4
[4]  {GARAM, GULA PUTIH}       => {PENYEDAP RASA}  0.005020080 1.0000000  0.005020080 45.272727 5
[5]  {TISU BASAH}              => {TISU KERING}    0.004016064 0.8000000  0.005020080 21.535135 4
[6]  {MARGARIN, MESES}         => {ROTI}           0.004016064 1.0000000  0.004016064 17.172414 4
[7]  {MESES}                   => {ROTI}           0.005020080 0.8333333  0.006024096 14.310345 5
[8]  {TELUR, TEMULAWAK}        => {SNACK}          0.003012048 1.0000000  0.003012048  5.858824 3
[9]  {PERMEN, SEREAL}          => {SNACK}          0.003012048 1.0000000  0.003012048  5.858824 3
[10] {SIRUP}                   => {SUSU}           0.004016064 0.8000000  0.005020080  5.732374 4
```

Gambar 5.42 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

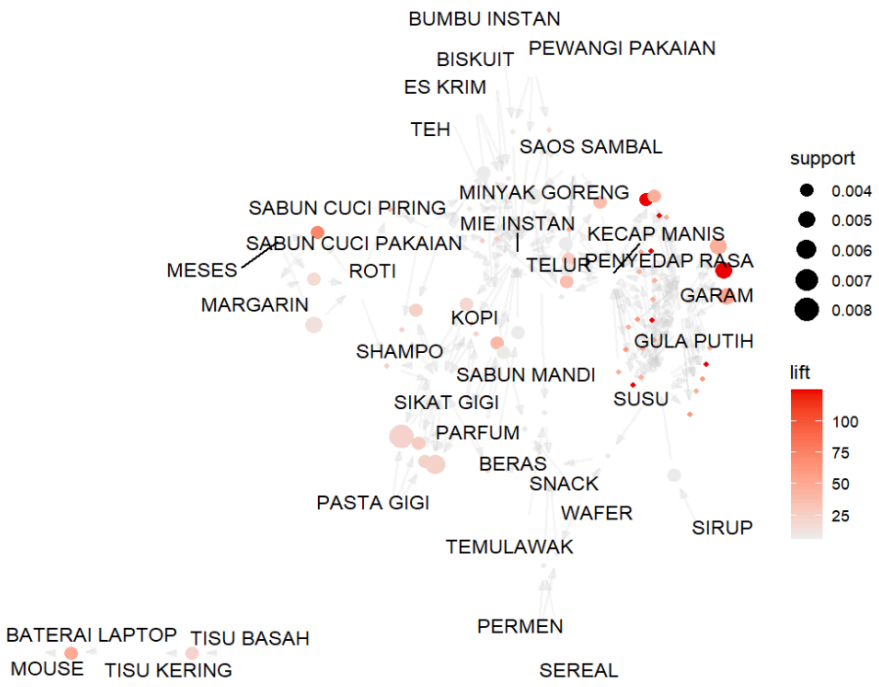
```
> summary(model5)
set of 77 rules

rule length distribution (lhs + rhs):sizes
 2  3  4  5
 4 33 35  5

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   4.000   3.532   4.000   5.000

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.003012   Min.   :0.8000   Min.   :0.003012   Min.   :  5.732   Min.   :3.000
 1st Qu.:0.003012   1st Qu.:1.0000   1st Qu.:0.003012   1st Qu.:  7.545   1st Qu.:3.000
 Median :0.003012   Median :1.0000   Median :0.003012   Median : 24.900   Median :3.000
 Mean   :0.003508   Mean   :0.9605   Mean   :0.003716   Mean   : 35.824   Mean   :3.494
 3rd Qu.:0.004016   3rd Qu.:1.0000   3rd Qu.:0.005020   3rd Qu.: 45.273   3rd Qu.:4.000
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :124.500   Max.   :8.000

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.003        0.8
                                                                                          call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.003, confidence = 0.8))
```

Gambar 5.43 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model5,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning message:
ggrepel: 34 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.44 Output dari Pembuatan Graph [1]

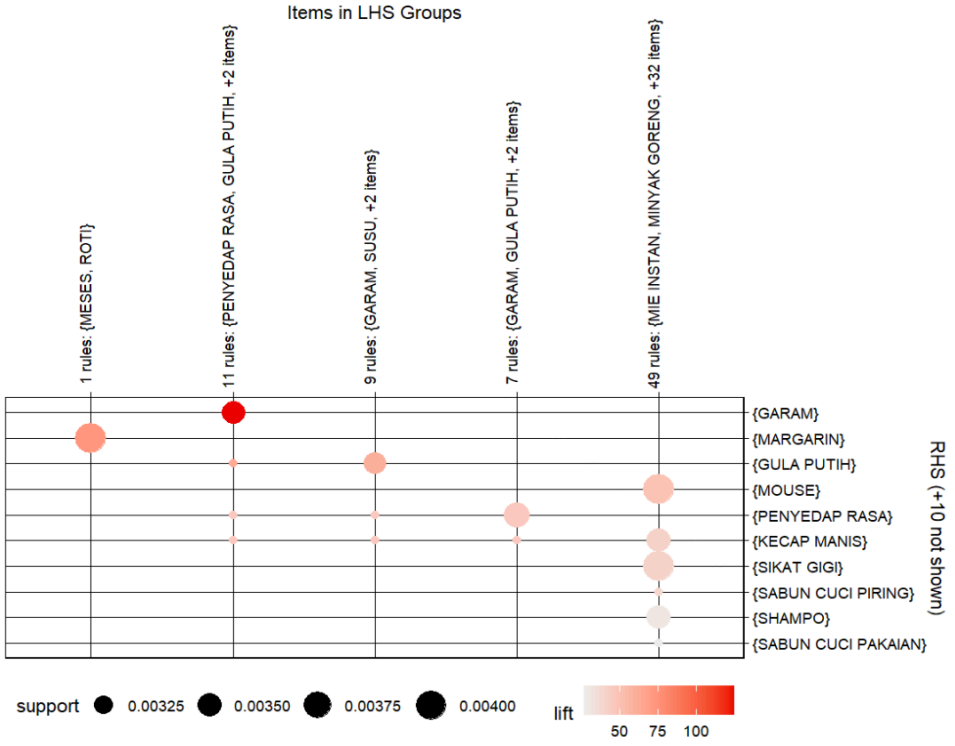


Gambar 5.45 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

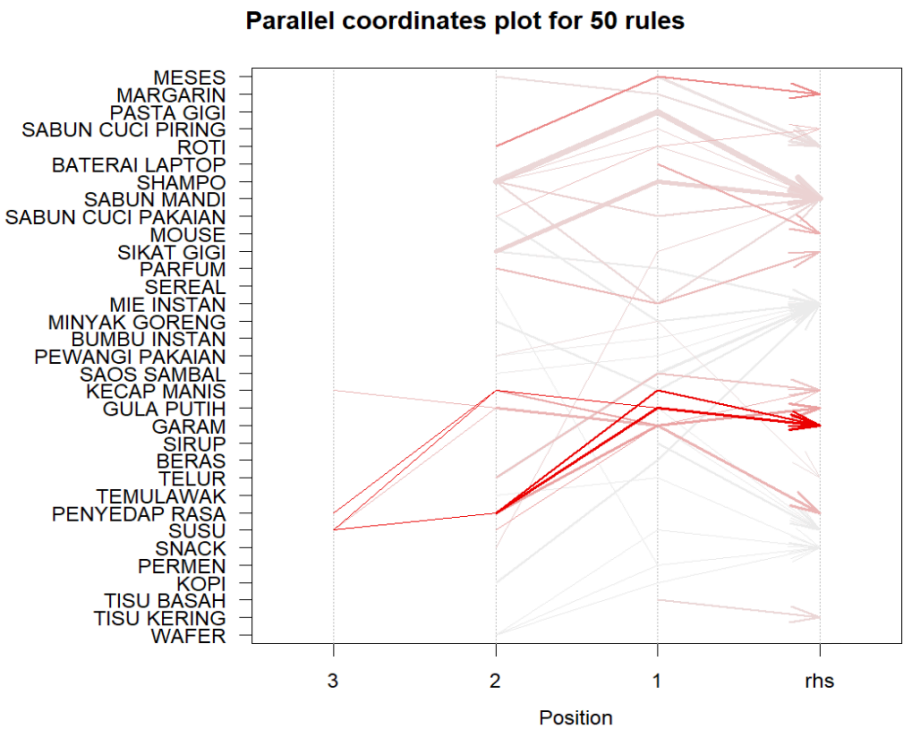
```
> plot(model5, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 14 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 14 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.46 Output dari Pembuatan Plot 5 rules[1]



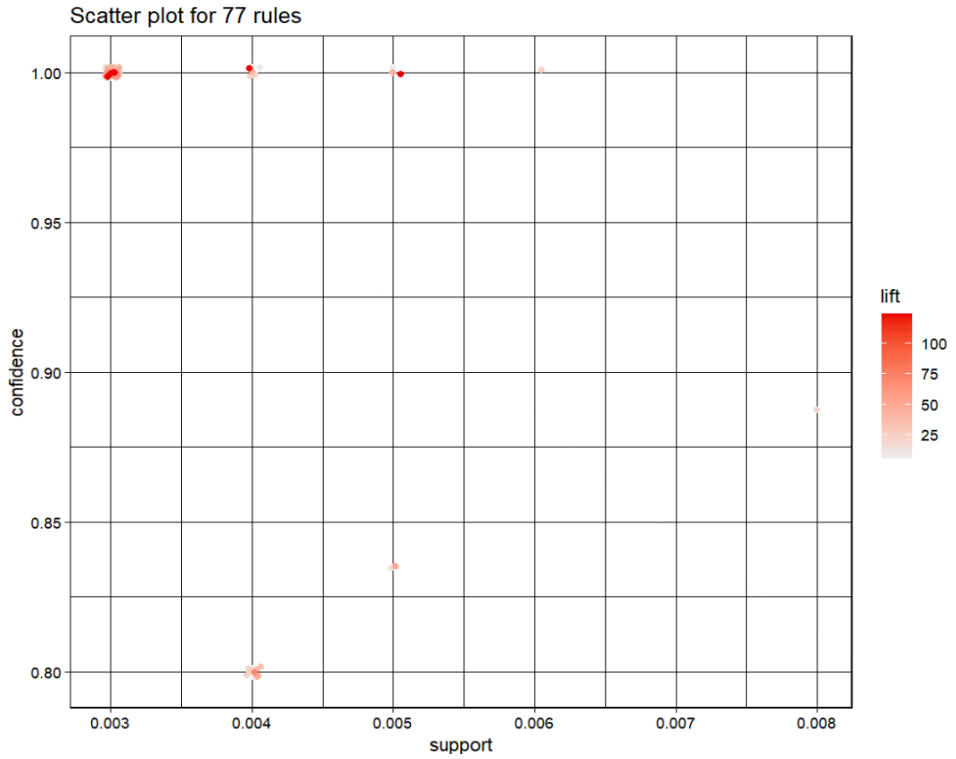
Gambar 5.47 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.48 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.49 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model5, subset = lhs %in% inputTest)
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.50 Hasil Prediksi

6.) Percobaan Keenam

Membuat model dengan parameter minlen = 2, support = 0.003, confident = 0.9. Hasilnya 61 rules.

```
> model6 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.9))
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.9    0.1    1 none FALSE            TRUE       5   0.003      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 2

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [148 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 done [0.00s].
writing ... [61 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.51 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model6))
[1] 61
> inspect(sort(model6[1:10], by = 'lift'))
     lhs                              rhs             support     confidence coverage    lift       count
[1]  {GULA PUTIH, PENYEDAP RASA}  => {GARAM}         0.005020080 1          0.005020080 124.500000 5
[2]  {KECAP MANIS, PENYEDAP RASA} => {GARAM}         0.004016064 1          0.004016064 124.500000 4
[3]  {GARAM, SUSU}                => {GULA PUTIH}    0.003012048 1          0.003012048  62.250000 3
[4]  {GARAM, GULA PUTIH}          => {PENYEDAP RASA} 0.005020080 1          0.005020080  45.272727 5
[5]  {GARAM, KECAP MANIS}         => {PENYEDAP RASA} 0.004016064 1          0.004016064  45.272727 4
[6]  {GARAM, SUSU}                => {PENYEDAP RASA} 0.003012048 1          0.003012048  45.272727 3
[7]  {GARAM, SUSU}                => {KECAP MANIS}   0.003012048 1          0.003012048  45.272727 3
[8]  {MARGARIN, MESES}            => {ROTI}          0.004016064 1          0.004016064  17.172414 4
[9]  {TELUR, TEMULAWAK}           => {SNACK}         0.003012048 1          0.003012048   5.858824 3
[10] {PERMEN, SEREAL}             => {SNACK}         0.003012048 1          0.003012048   5.858824 3
```

Gambar 5.52 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

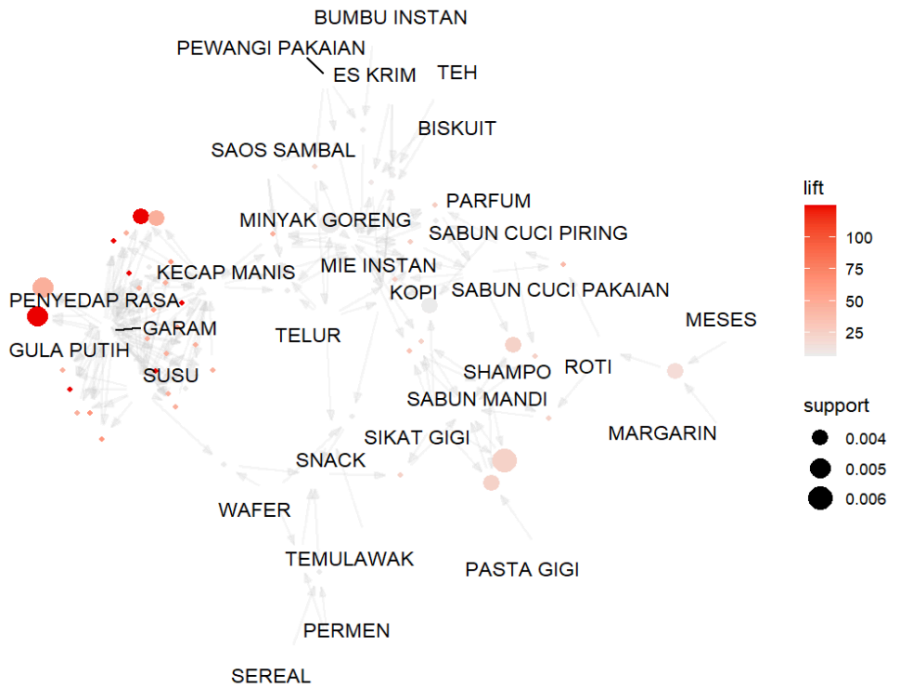
```
> summary(model6)
set of 61 rules

rule length distribution (lhs + rhs):sizes
 3  4  5
24 32  5

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  3.000   3.000   4.000   3.689   4.000   5.000

summary of quality measures:
    support           confidence    coverage             lift            count
 Min.   :0.003012   Min.   :1    Min.   :0.003012   Min.   :  5.859   Min.   :3.000
 1st Qu.:0.003012   1st Qu.:1    1st Qu.:0.003012   1st Qu.:  7.545   1st Qu.:3.000
 Median :0.003012   Median :1    Median :0.003012   Median : 24.900   Median :3.000
 Mean   :0.003275   Mean   :1    Mean   :0.003275   Mean   : 38.031   Mean   :3.262
 3rd Qu.:0.003012   3rd Qu.:1    3rd Qu.:0.003012   3rd Qu.: 45.273   3rd Qu.:3.000
 Max.   :0.006024   Max.   :1    Max.   :0.006024   Max.   :124.500   Max.   :6.000

mining info:
            data ntransactions support confidence
 transaction_matrix           996   0.003        0.9
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.003, confidence = 0.9))
```

Gambar 5.53 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model6,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning message:
ggrepel: 27 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.54 Output dari Pembuatan Graph [1]

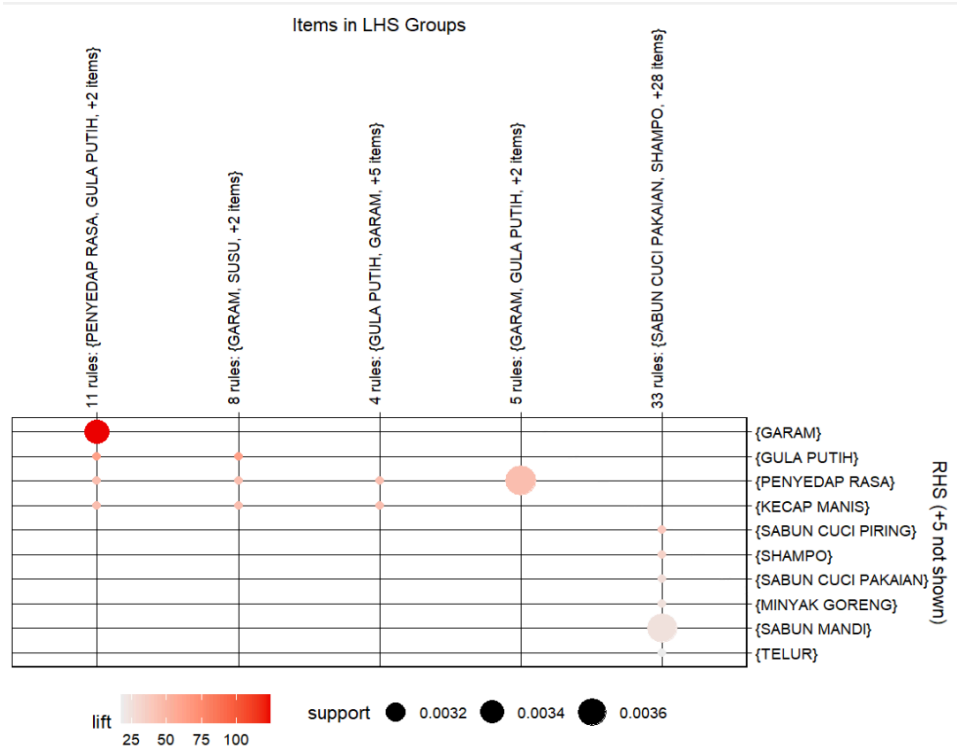


Gambar 5.55 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

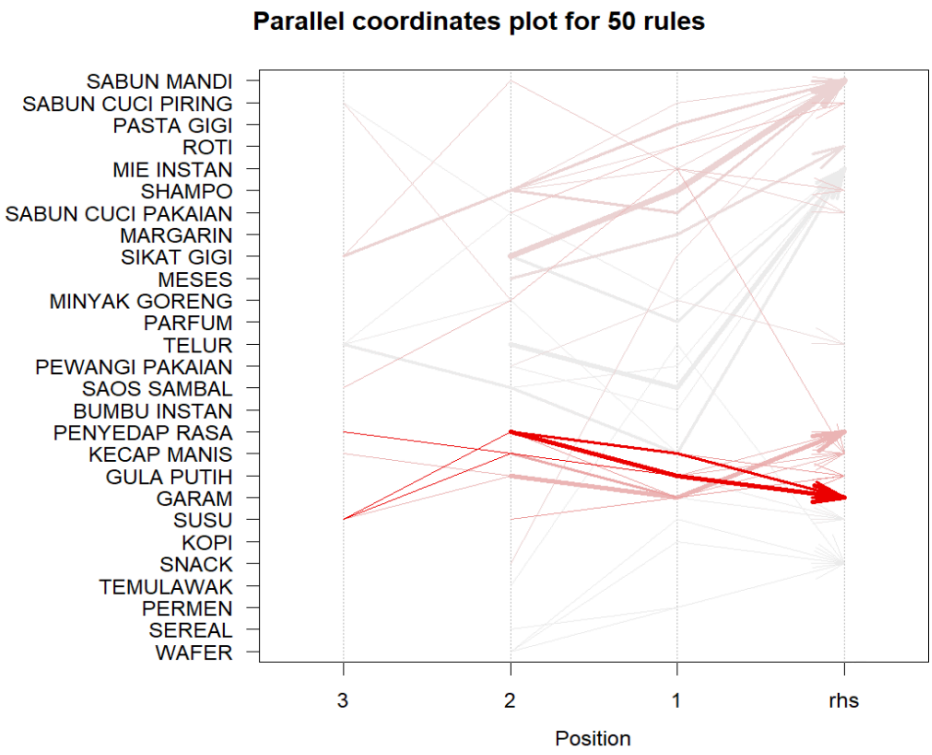
```
> plot(model6, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 9 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 9 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.56 Output dari Pembuatan Plot 5 rules[1]



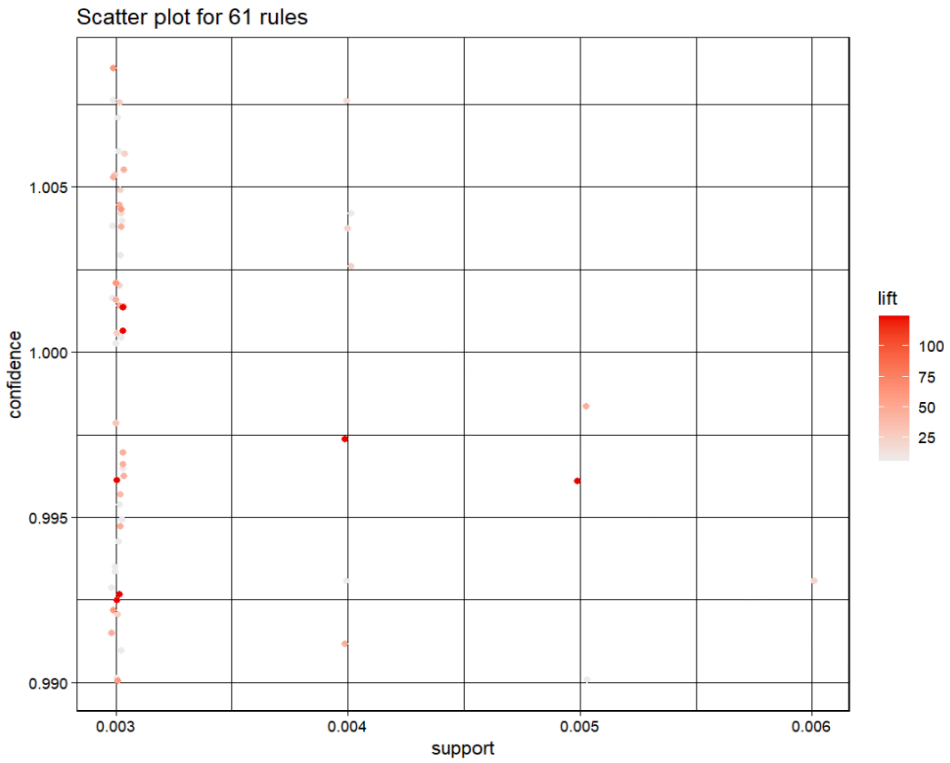
Gambar 5.57 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.58 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.59 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model6, subset = lhs %in% inputTest)
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.60 Hasil Prediksi

7.) Percobaan Ketujuh

Membuat model dengan parameter minlen = 2, support = 0.004, confident = 0.8. Hasilnya 27 rules.

```
> model7 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.004, confidence = 0.8))
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.8    0.1    1 none FALSE            TRUE       5   0.004      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 3

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [125 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 done [0.00s].
writing ... [27 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.61 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model7))
[1] 27
> inspect(sort(model7[1:10], by = 'lift'))
     lhs                                rhs             support     confidence coverage    lift       count
[1]  {GULA PUTIH, PENYEDAP RASA} => {GARAM}         0.005020080 1.0000000  0.005020080 124.500000 5
[2]  {MESES, ROTI}               => {MARGARIN}      0.004016064 0.8000000  0.005020080  72.436364 4
[3]  {GARAM, PENYEDAP RASA}      => {GULA PUTIH}    0.005020080 0.8333333  0.006024096  51.875000 5
[4]  {BATERAI LAPTOP}            => {MOUSE}         0.004016064 0.8000000  0.005020080  49.800000 4
[5]  {GARAM, GULA PUTIH}         => {PENYEDAP RASA} 0.005020080 1.0000000  0.005020080  45.272727 5
[6]  {GARAM, KECAP MANIS}        => {PENYEDAP RASA} 0.004016064 1.0000000  0.004016064  45.272727 4
[7]  {TISU BASAH}                => {TISU KERING}   0.004016064 0.8000000  0.005020080  21.535135 4
[8]  {MARGARIN, MESES}           => {ROTI}          0.004016064 1.0000000  0.004016064  17.172414 4
[9]  {MESES}                     => {ROTI}          0.005020080 0.8333333  0.006024096  14.310345 5
[10] {SIRUP}                     => {SUSU}          0.004016064 0.8000000  0.005020080   5.732374 4
```

Gambar 5.62 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

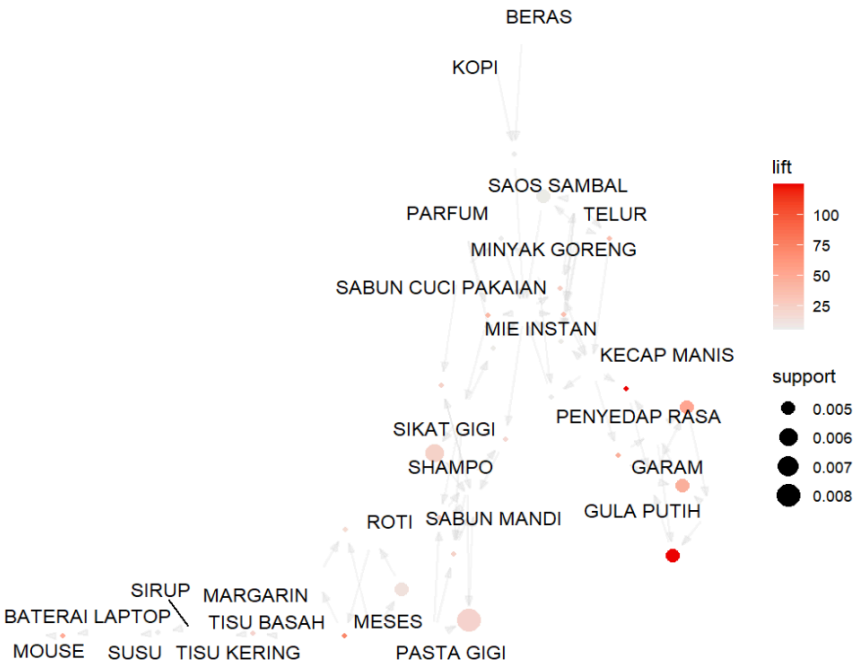
```
> summary(model7)
set of 27 rules

rule length distribution (lhs + rhs):sizes
 2  3  4
 4 18  5

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   3.000   3.037   3.000   4.000

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.004016   Min.   :0.8000   Min.   :0.004016   Min.   :  5.732   Min.   :4.000
 1st Qu.:0.004016   1st Qu.:0.8000   1st Qu.:0.004518   1st Qu.: 10.928   1st Qu.:4.000
 Median :0.004016   Median :0.8333   Median :0.005020   Median : 24.293   Median :4.000
 Mean   :0.004425   Mean   :0.8872   Mean   :0.005020   Mean   : 32.992   Mean   :4.407
 3rd Qu.:0.004518   3rd Qu.:1.0000   3rd Qu.:0.005020   3rd Qu.: 42.556   3rd Qu.:4.500
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :124.500   Max.   :8.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.004        0.8
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.004, confidence = 0.8))
```

Gambar 5.63 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model7,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning message:
ggrepel: 21 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.64 Output dari Pembuatan Graph [1]

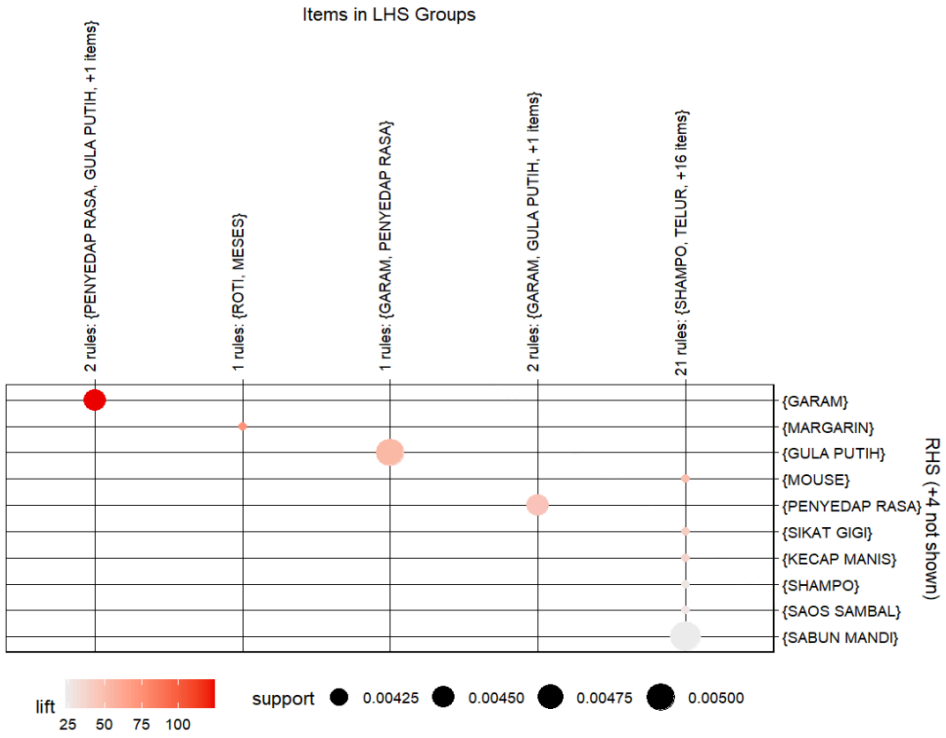


Gambar 5.65 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

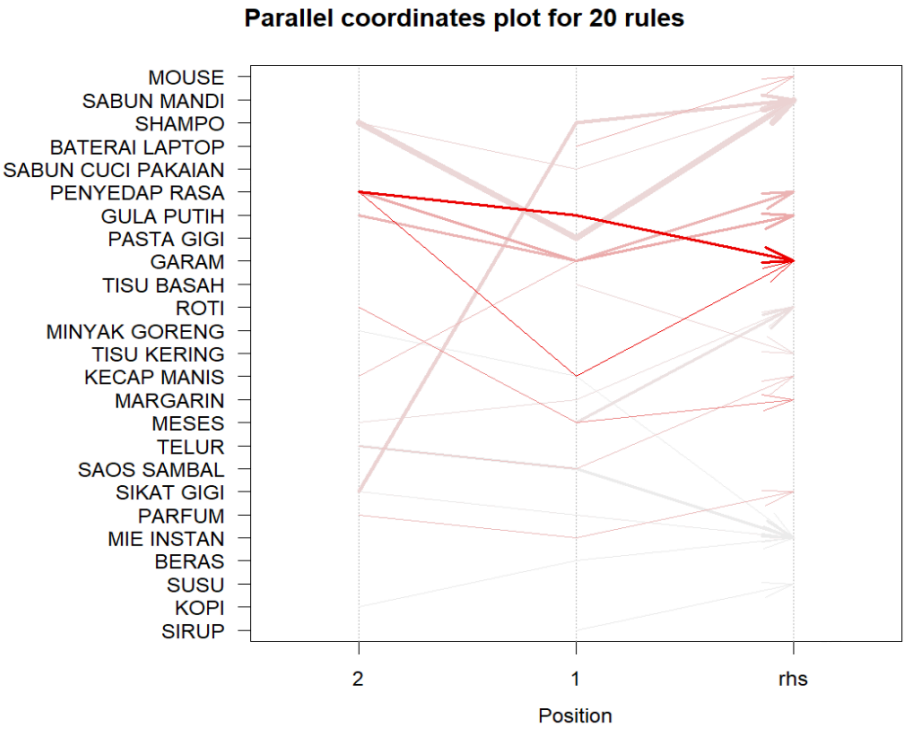
```
> plot(model3, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 10 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 10 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.66 Output dari Pembuatan Plot 5 rules[1]



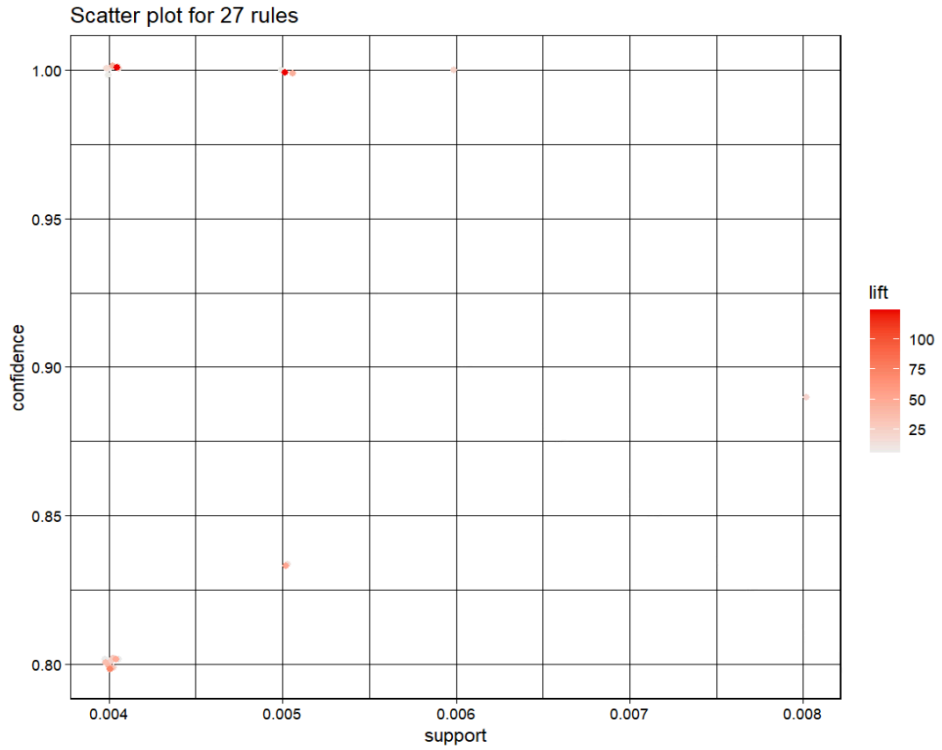
Gambar 5.67 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.68 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.69 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model7, subset = lhs %in% inputTest)
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.70 Hasil Prediksi

8.) Percobaan Kedelapan

Membuat model dengan parameter minlen = 2, support = 0.004, confident = 0.6. Hasilnya 55 rules.

```
> model8 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.004, confidence = 0.6))
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.6    0.1    1 none FALSE            TRUE       5   0.004      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 3

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [125 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 done [0.00s].
writing ... [55 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.71 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model8))
[1] 55
> inspect(sort(model8[1:10], by = 'lift'))
     lhs                 rhs              support     confidence coverage    lift      count
[1]  {MONITOR}        => {MOUSE PAD}      0.006024096 0.7500000  0.008032129 74.700000  6
[2]  {MOUSE PAD}      => {MONITOR}        0.006024096 0.6000000  0.010040161 74.700000  6
[3]  {MESES}          => {MARGARIN}       0.004016064 0.6666667  0.006024096 60.363636  4
[4]  {BATERAI LAPTOP} => {MOUSE}          0.004016064 0.8000000  0.005020080 49.800000  4
[5]  {GARAM}          => {GULA PUTIH}     0.005020080 0.6250000  0.008032129 38.906250  5
[6]  {GARAM}          => {PENYEDAP RASA}  0.006024096 0.7500000  0.008032129 33.954545  6
[7]  {TISU BASAH}     => {TISU KERING}    0.004016064 0.8000000  0.005020080 21.535135  4
[8]  {SHAMPO}         => {SABUN MANDI}    0.019076305 0.6333333  0.030120482 15.385366 19
[9]  {MESES}          => {ROTI}           0.005020080 0.8333333  0.006024096 14.310345  5
[10] {SIRUP}          => {SUSU}           0.004016064 0.8000000  0.005020080  5.732374  4
```

Gambar 5.72 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

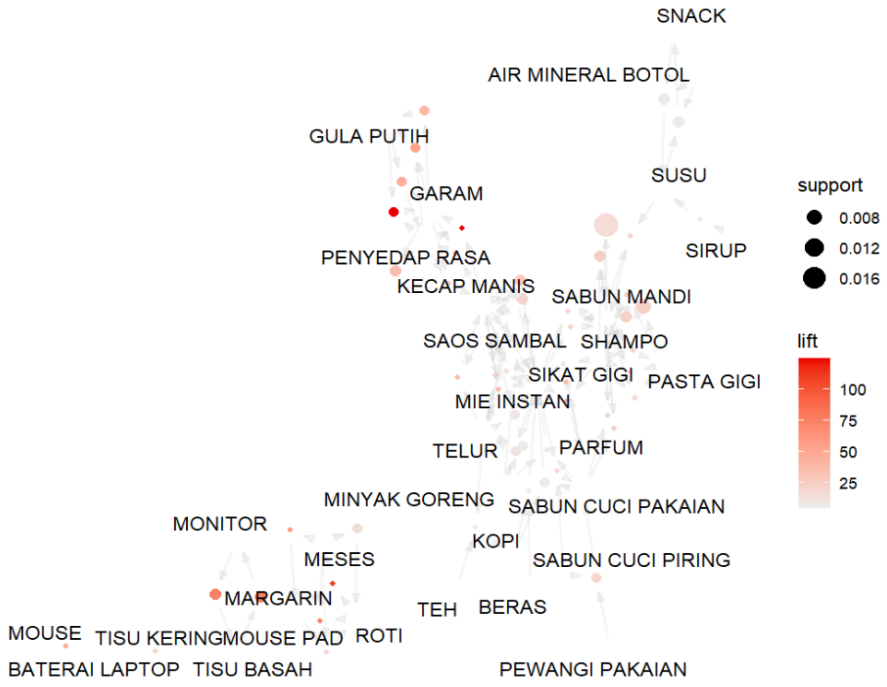
```
> summary(model8)
set of 55 rules

rule length distribution (lhs + rhs):sizes
 2  3  4
10 38  7

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   3.000   2.945   3.000   4.000

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.004016   Min.   :0.6000   Min.   :0.004016   Min.   :  4.394   Min.   : 4.000
 1st Qu.:0.004016   1st Qu.:0.6667   1st Qu.:0.005020   1st Qu.:  9.233   1st Qu.: 4.000
 Median :0.004016   Median :0.7500   Median :0.006024   Median : 22.133   Median : 4.000
 Mean   :0.004929   Mean   :0.7751   Mean   :0.006627   Mean   : 29.840   Mean   : 4.909
 3rd Qu.:0.005020   3rd Qu.:0.8167   3rd Qu.:0.008032   3rd Qu.: 37.562   3rd Qu.: 5.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.030120   Max.   :124.500   Max.   :19.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.004        0.6
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.004, confidence = 0.6))
```

Gambar 5.73 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model8,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning message:
ggrepel: 29 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.74 Output dari Pembuatan Graph [1]

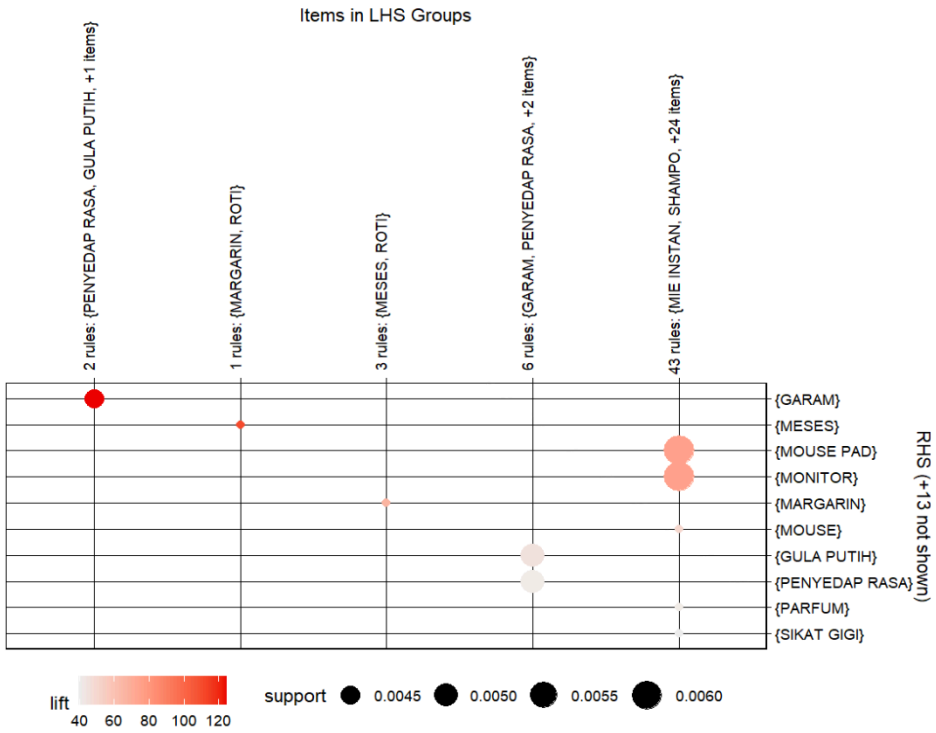


Gambar 5.75 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

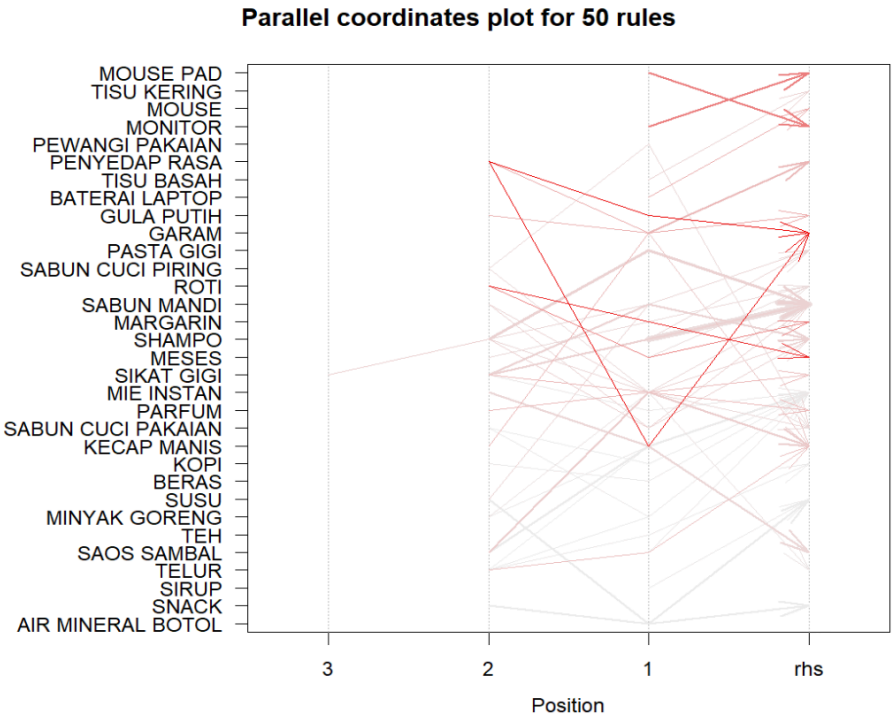
```
> plot(model8, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 16 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 16 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.76 Output dari Pembuatan Plot 5 rules[1]



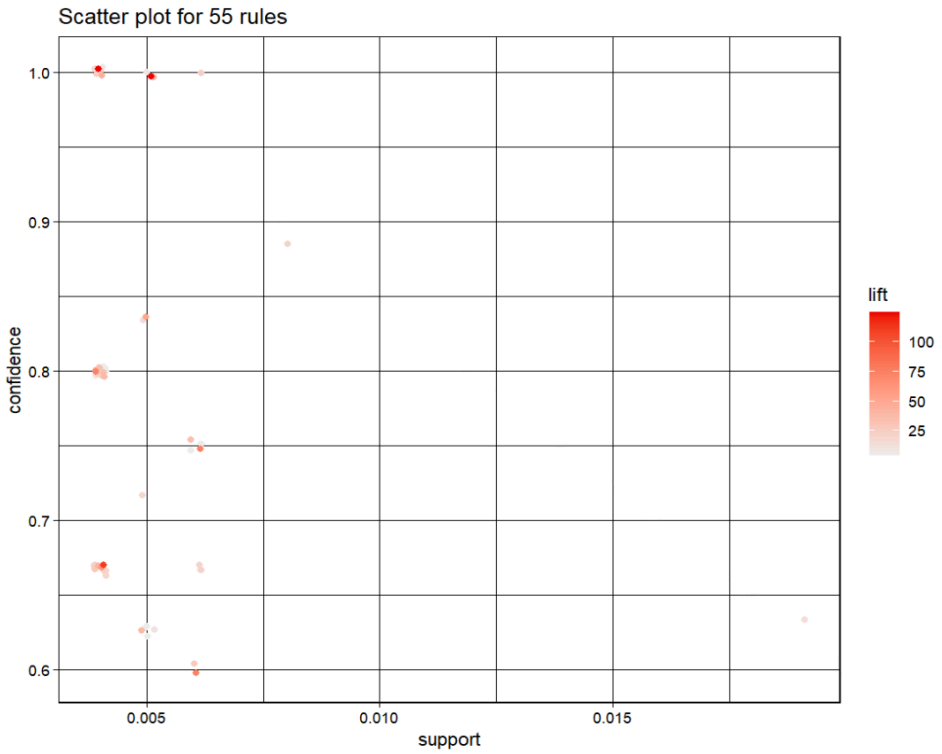
Gambar 5.77 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.78 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.79 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model8, subset = lhs %in% inputTest)
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.80 Hasil Prediksi

9.) Percobaan Kesembilan

Membuat model dengan parameter minlen = 2, support = 0.004, confident = 0.5. Hasilnya 91 rules.

```
> model9 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.004, confidence = 0.5))
baan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.5    0.1    1 none FALSE            TRUE       5   0.004      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 3

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [125 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 done [0.00s].
writing ... [91 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.81 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model9))
[1] 91
> inspect(sort(model9[1:10], by = 'lift'))
     lhs                 rhs           support     confidence coverage    lift      count
[1]  {MONITOR}        => {MOUSE PAD}   0.006024096 0.7500000  0.008032129 74.700000 6
[2]  {MOUSE PAD}      => {MONITOR}     0.006024096 0.6000000  0.010040161 74.700000 6
[3]  {MESES}          => {MARGARIN}    0.004016064 0.6666667  0.006024096 60.363636 4
[4]  {BATERAI LAPTOP} => {MOUSE}       0.004016064 0.8000000  0.005020080 49.800000 4
[5]  {KEYBOARD}       => {MOUSE PAD}   0.004016064 0.5000000  0.008032129 49.800000 4
[6]  {MONITOR}        => {SPEAKER}     0.004016064 0.5000000  0.008032129 49.800000 4
[7]  {KEYBOARD}       => {TINTA}       0.004016064 0.5000000  0.008032129 41.500000 4
[8]  {TISU BASAH}     => {TISU KERING} 0.004016064 0.8000000  0.005020080 21.535135 4
[9]  {MESES}          => {ROTI}        0.005020080 0.8333333  0.006024096 14.310345 5
[10] {SIRUP}          => {SUSU}        0.004016064 0.8000000  0.005020080  5.732374 4
> summary(model9)
set of 91 rules
```

Gambar 5.82 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

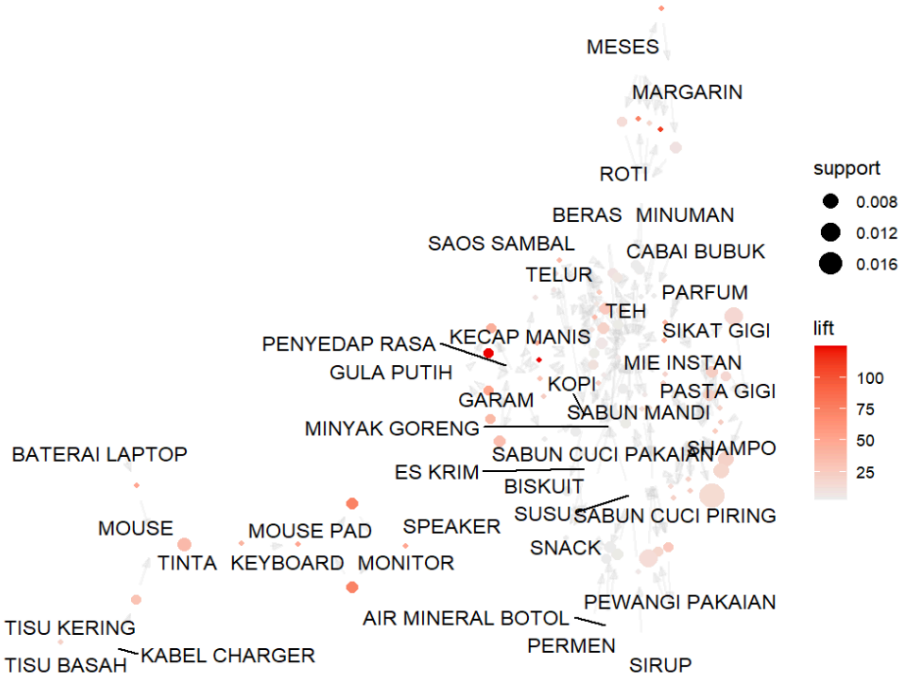
```
> summary(model9)
set of 91 rules

rule length distribution (lhs + rhs):sizes
 2  3  4
22 61  8

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   3.000   2.846   3.000   4.000

summary of quality measures:
    support         confidence        coverage             lift            count
 Min.   :0.004016   Min.   :0.5000   Min.   :0.004016   Min.   :  2.929   Min.   : 4.000
 1st Qu.:0.004016   1st Qu.:0.5286   1st Qu.:0.005522   1st Qu.:  5.884   1st Qu.: 4.000
 Median :0.004016   Median :0.6667   Median :0.008032   Median : 17.474   Median : 4.000
 Mean   :0.004976   Mean   :0.6750   Mean   :0.007822   Mean   : 23.689   Mean   : 4.956
 3rd Qu.:0.005020   3rd Qu.:0.8000   3rd Qu.:0.009036   3rd Qu.: 28.673   3rd Qu.: 5.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.030120   Max.   :124.500   Max.   :19.000

mining info:
            data ntransactions support confidence
 transaction_matrix           996   0.004        0.5
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.004, confidence = 0.5))
```

Gambar 5.83 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model9,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning message:
ggrepel: 39 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.84 Output dari Pembuatan Graph [1]

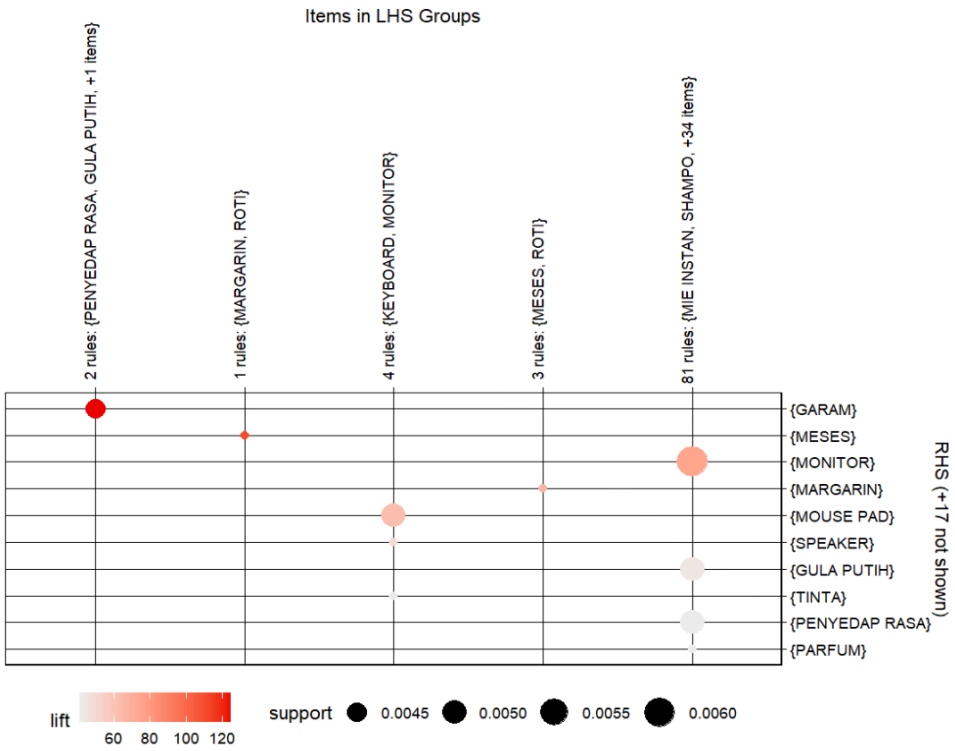


Gambar 5.85 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

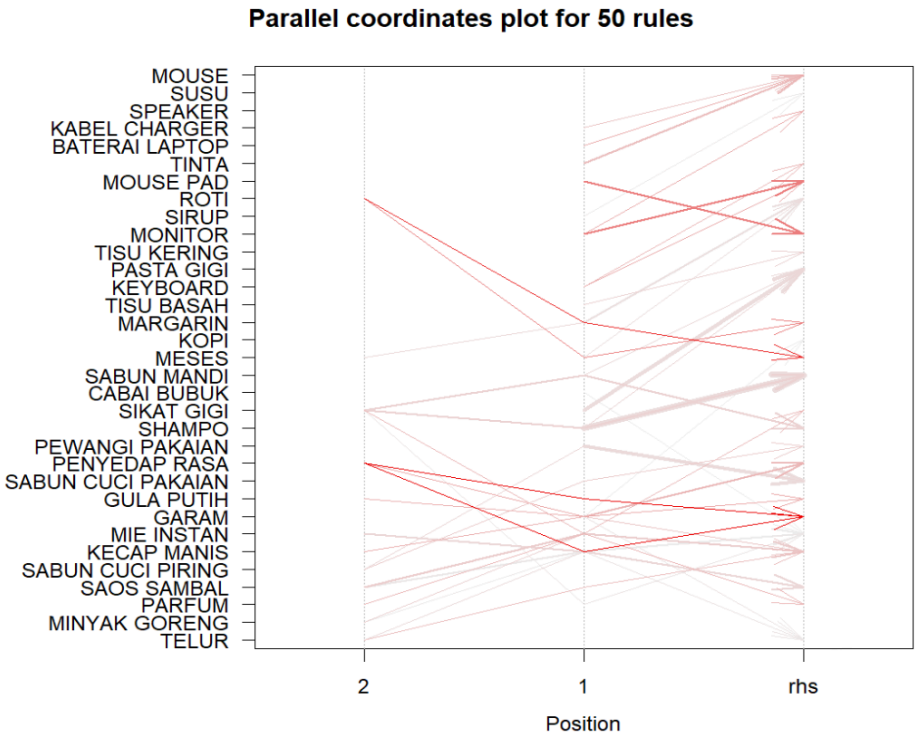
```
> plot(model9, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 30 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 30 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.86 Output dari Pembuatan Plot 5 rules[1]



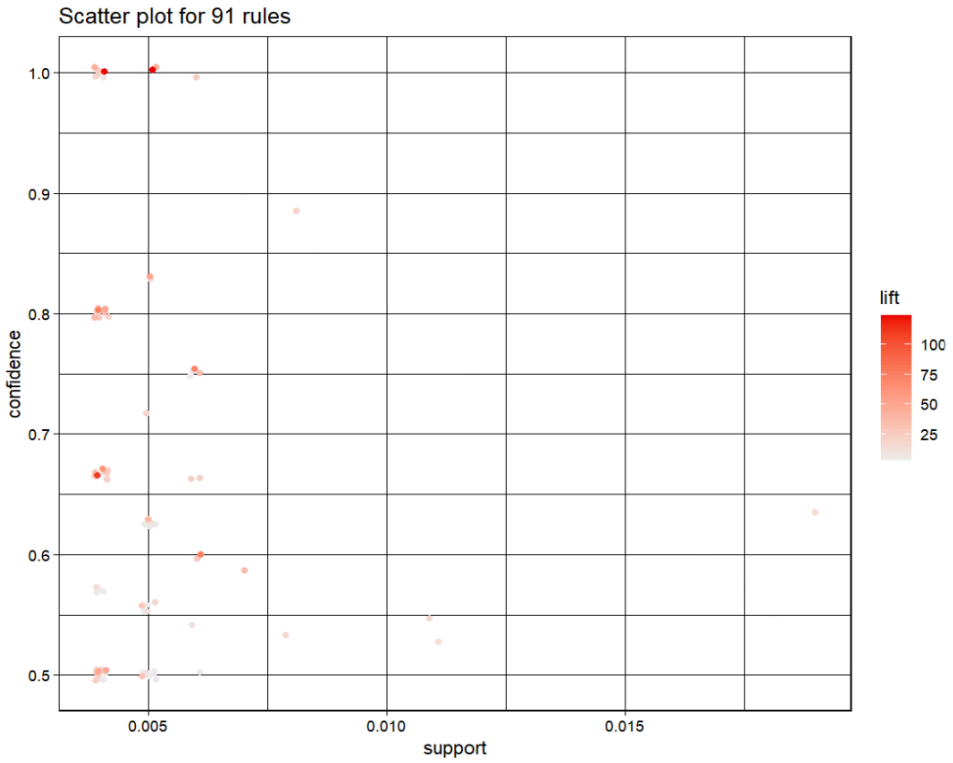
Gambar 5.87 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.88 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.89 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model9, subset = lhs %in% inputTest)
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.90 Hasil Prediksi

10.) Percobaan Kesepuluh

Membuat model dengan parameter minlen = 2, support = 0.001, confident = 0.7. Hasilnya 979689 rules.

```
> model10 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.001, confidence = 0.7))
obaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.7    0.1    1 none FALSE            TRUE       5   0.001      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 0

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [308 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 7 8 9 10 done [0.05s].
writing ... [979689 rule(s)] done [0.61s].
creating S4 object  ... done [0.42s].
```

Gambar 5.91 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model10))
[1] 979689
> inspect(sort(model10[1:10], by = 'lift'))
     lhs                   rhs             support     confidence coverage    lift  count
[1]  {PLESTER}          => {ANTISEPTIK}    0.001004016 1          0.001004016 996.0 1
[2]  {ANTISEPTIK}       => {PLESTER}       0.001004016 1          0.001004016 996.0 1
[3]  {BOLA}             => {RAKET TENIS}   0.001004016 1          0.001004016 996.0 1
[4]  {RAKET TENIS}      => {BOLA}          0.001004016 1          0.001004016 996.0 1
[5]  {KAOS KAKI}        => {SEPATU}        0.001004016 1          0.001004016 996.0 1
[6]  {CAIRAN SOFTLENS}  => {LENSA KONTAK}  0.001004016 1          0.001004016 498.0 1
[7]  {SPREI}            => {HANDUK}        0.001004016 1          0.001004016 498.0 1
[8]  {TOPI}             => {WIG}           0.001004016 1          0.001004016 249.0 1
[9]  {KALUNG}           => {BAJU}          0.001004016 1          0.001004016 199.2 1
[10] {KERTAS}           => {TINTA}         0.001004016 1          0.001004016  83.0 1
```

Gambar 5.92 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

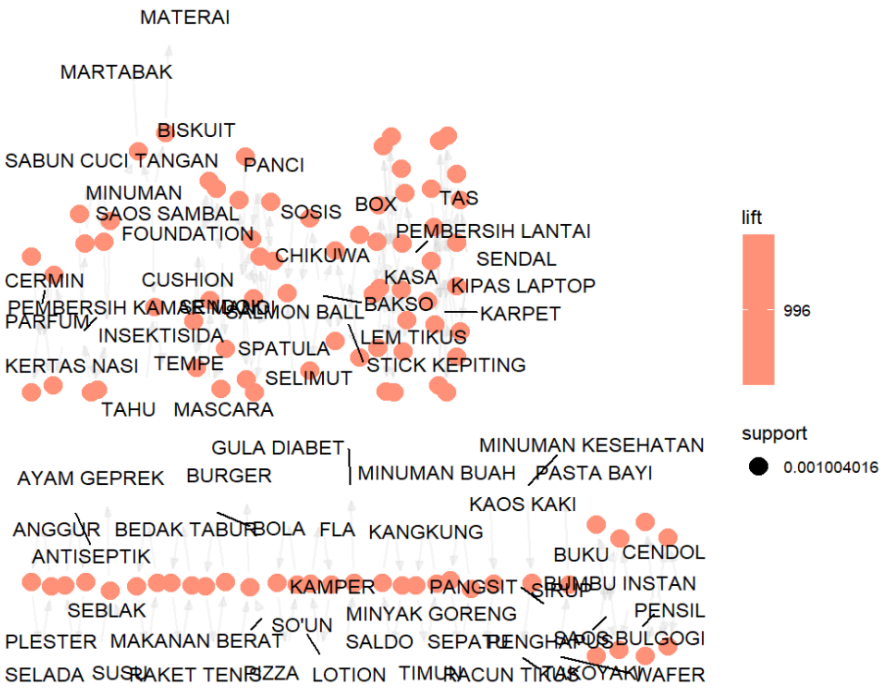
```
> summary(model10)
set of 979689 rules

rule length distribution (lhs + rhs):sizes
     2      3      4      5      6      7      8      9     10
   390   6909  25054  55558 101495 159089 209072 225522 196600

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   7.000   8.000   7.952   9.000  10.000

summary of quality measures:
    support           confidence        coverage             lift             count
 Min.   :0.001004   Min.   :0.7143   Min.   :0.001004   Min.   :  4.394   Min.   :1.000
 1st Qu.:0.001004   1st Qu.:1.0000   1st Qu.:0.001004   1st Qu.: 24.900   1st Qu.:1.000
 Median :0.001004   Median :1.0000   Median :0.001004   Median : 45.273   Median :1.000
 Mean   :0.001005   Mean   :1.0000   Mean   :0.001005   Mean   :153.265   Mean   :1.001
 3rd Qu.:0.001004   3rd Qu.:1.0000   3rd Qu.:0.001004   3rd Qu.:249.000   3rd Qu.:1.000
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :996.000   Max.   :8.000

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.001        0.7
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.001, confidence = 0.7))
```

Gambar 5.93 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model10,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if neede
d).
2: ggrepel: 75 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.94 Output dari Pembuatan Graph [1]

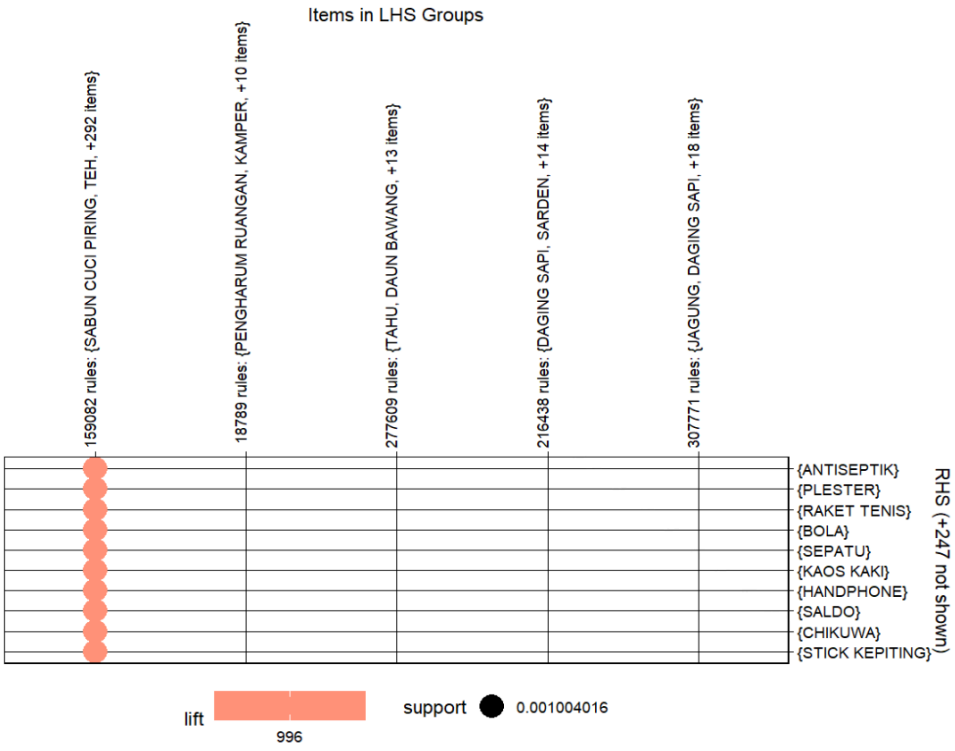


Gambar 5.95 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

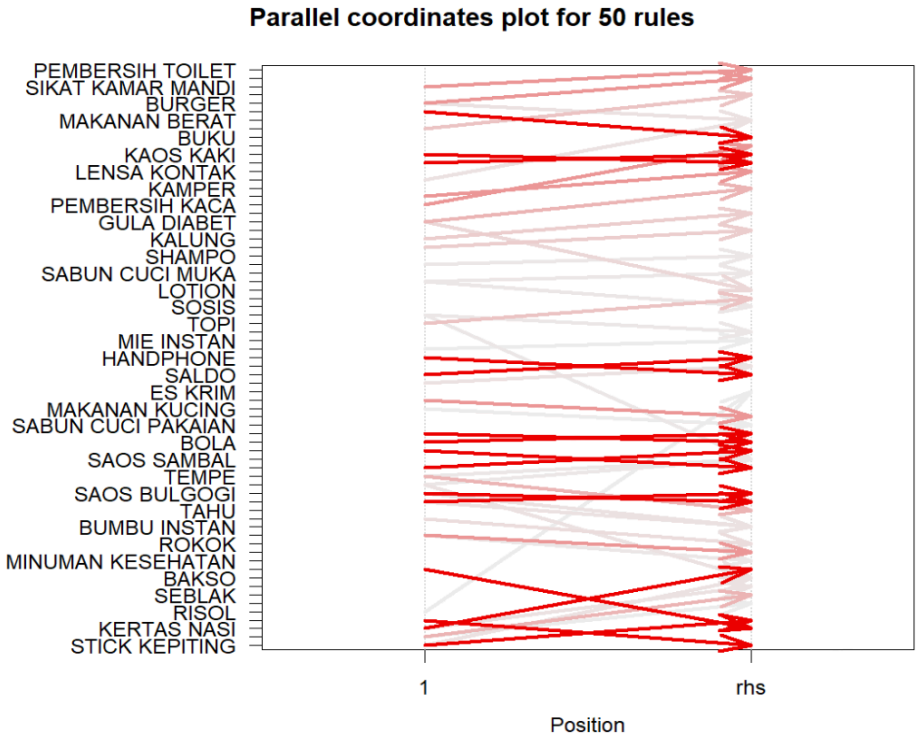
```
> plot(model10, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 74 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 74 unlabeled data points (too many overlaps). Consider increasing max.overlaps
3: ggrepel: 6 unlabeled data points (too many overlaps). Consider increasing max.overlaps
4: ggrepel: 6 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.96 Output dari Pembuatan Plot 5 rules[1]



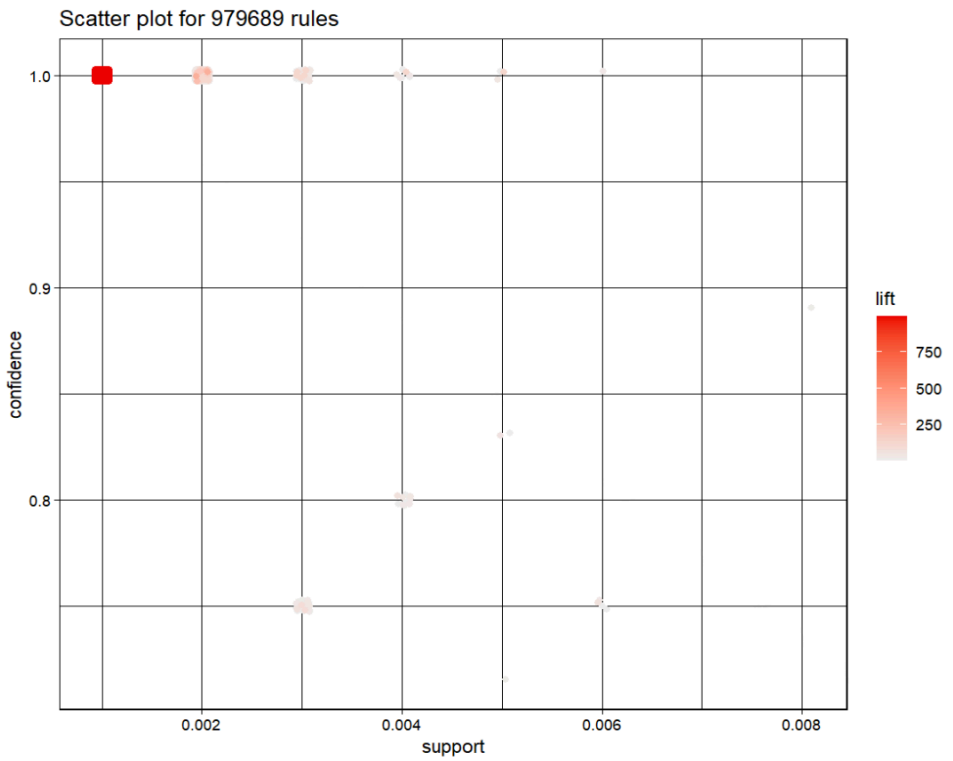
Gambar 5.97 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.98 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.99 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model10, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
 [1] "KOPI"              "SUSU"               "MIE INSTAN"           "SELADA"
 [5] "ANGGUR"            "TOMAT"              "JAMUR"                "APEL"
 [9] "TEH"               "SELAI"              "TEPUNG MAIZENA"       "TEPUNG TERIGU"
[13] "MINYAK GORENG"     "AIR MINERAL BOTOL"  "BIHUN"                "POPCORN"
[17] "GAS"               "ES KRIM"            "RUMPUT LAUT"          "SAUS TOMAT"
[21] "SOSIS"             "MINUMAN"            "SABUN CUCI PIRING"    "SABUN CUCI PAKAIAN"
[25] "ROTI"              "SNACK"              "MINUMAN BERKARBONASI" "SEMANGKA"
[29] "TELUR"             "PEMBERSIH LANTAI"   "SAOS TIRAM"           "PERMEN"
[33] "BISKUIT"           "WAFLE"              "MARGARIN"
```

Gambar 5.100 Hasil Prediksi

11.) Percobaan Kesebelas

Membuat model dengan parameter minlen = 2, support = 0.001, confident = 0.8. Hasilnya 979639 rules.

```
> model11 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.001, confidence = 0.8)) #Percobaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.8    0.1    1 none FALSE            TRUE       5   0.001      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 0

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [308 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 7 8 9 10 done [0.13s].
writing ... [979639 rule(s)] done [0.95s].
creating S4 object  ... done [0.87s].
Warning message:
In apriori(transaction_matrix, parameter = list(minlen = 2, support = 0.001,  :
  Mining stopped (maxlen reached). Only patterns up to a length of 10 returned!
```

Gambar 5.101 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model11))
[1] 979639
> inspect(sort(model11[1:10], by = 'lift'))
     lhs                 rhs              support     confidence coverage    lift  count
[1]  {PLESTER}        => {ANTISEPTIK}    0.001004016 1          0.001004016 996.0 1
[2]  {ANTISEPTIK}     => {PLESTER}       0.001004016 1          0.001004016 996.0 1
[3]  {BOLA}           => {RAKET TENIS}   0.001004016 1          0.001004016 996.0 1
[4]  {RAKET TENIS}    => {BOLA}          0.001004016 1          0.001004016 996.0 1
[5]  {KAOS KAKI}      => {SEPATU}        0.001004016 1          0.001004016 996.0 1
[6]  {CAIRAN SOFTLENS} => {LENSA KONTAK} 0.001004016 1          0.001004016 498.0 1
[7]  {SPREI}          => {HANDUK}        0.001004016 1          0.001004016 498.0 1
[8]  {TOPI}           => {WIG}           0.001004016 1          0.001004016 249.0 1
[9]  {KALUNG}         => {BAJU}          0.001004016 1          0.001004016 199.2 1
[10] {KERTAS}         => {TINTA}         0.001004016 1          0.001004016  83.0 1
```

Gambar 5.102 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

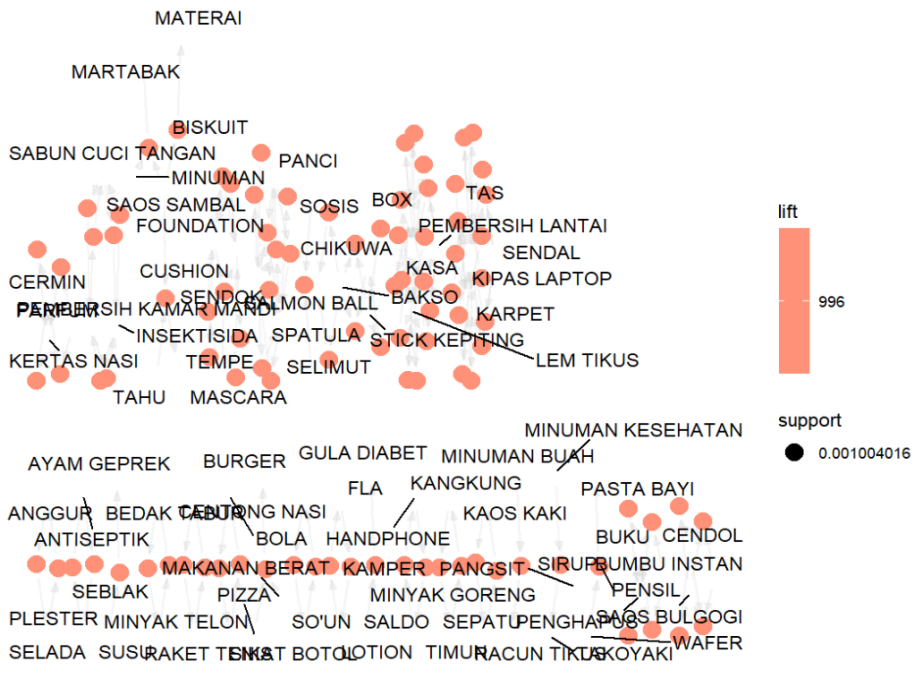
```
> summary(model11)
set of 979639 rules

rule length distribution (lhs + rhs):sizes
     2      3      4      5      6      7      8      9     10
   383   6879  25041  55558 101495 159089 209072 225522 196600

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   7.000   8.000   7.952   9.000  10.000

summary of quality measures:
    support           confidence     coverage            lift            count
 Min.   :0.001004   Min.   :0.8   Min.   :0.001004   Min.   :  5.732   Min.   :1.000
 1st Qu.:0.001004   1st Qu.:1.0   1st Qu.:0.001004   1st Qu.: 24.900   1st Qu.:1.000
 Median :0.001004   Median :1.0   Median :0.001004   Median : 45.273   Median :1.000
 Mean   :0.001005   Mean   :1.0   Mean   :0.001005   Mean   :153.272   Mean   :1.001
 3rd Qu.:0.001004   3rd Qu.:1.0   3rd Qu.:0.001004   3rd Qu.:249.000   3rd Qu.:1.000
 Max.   :0.008032   Max.   :1.0   Max.   :0.009036   Max.   :996.000   Max.   :8.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.001        0.8
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.001, confidence = 0.8))
```

Gambar 5.103 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model11,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max
d).
2: ggrepel: 75 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.104 Output dari Pembuatan Graph [1]

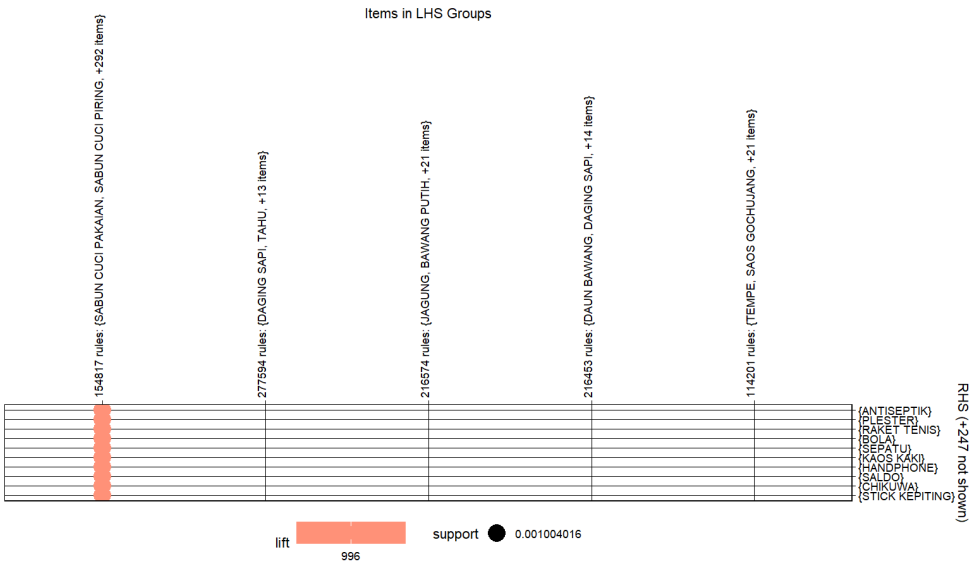


Gambar 5.105 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

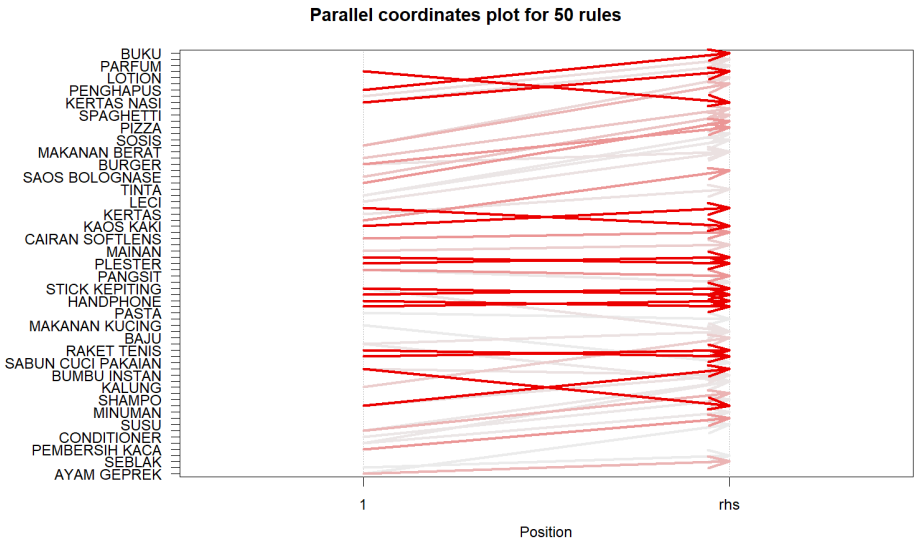
```
> plot(model11, method = "grouped", control = list(k = 5))
```

Gambar 5.106 Output dari Pembuatan Plot 5 rules[1]



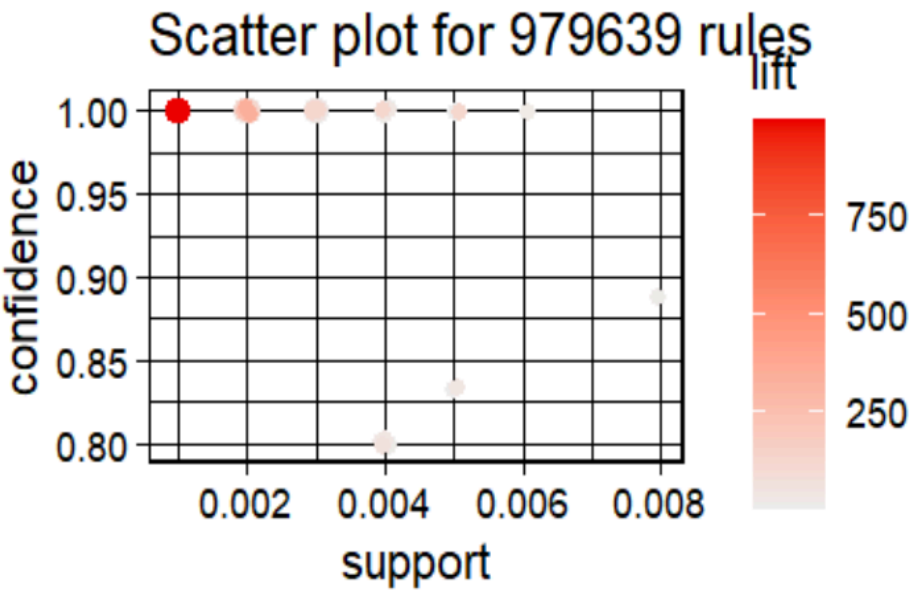
Gambar 5.107 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.108 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.109 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model11, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
 [1] "KOPI"                "SUSU"                "MIE INSTAN"           "SELADA"
 [5] "ANGGUR"              "TOMAT"               "JAMUR"                "APEL"
 [9] "TEH"                 "SELAI"               "TEPUNG MAIZENA"       "TEPUNG TERIGU"
[13] "MINYAK GORENG"       "AIR MINERAL BOTOL"   "BIHUN"                "POPCORN"
[17] "GAS"                 "ES KRIM"             "RUMPUT LAUT"          "SAUS TOMAT"
[21] "SOSIS"               "MINUMAN"             "SABUN CUCI PIRING"    "SABUN CUCI PAKAIAN
[25] "ROTI"                "SNACK"               "MINUMAN BERKARBONASI" "SEMANGKA"
[29] "TELUR"               "PEMBERSIH LANTAI"    "SAOS TIRAM"           "PERMEN"
[33] "BISKUIT"             "WAFLE"               "MARGARIN"
>
```

Gambar 5.110 Hasil Prediksi

12.) Percobaan Kedua Belas

Membuat model dengan parameter minlen = 2, support = 0.002, confident = 0.6. Hasilnya 1000 rules.

```
> model12 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.6)) #Percobaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.6    0.1    1 none FALSE            TRUE       5   0.002      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 1

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [192 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 done [0.00s].
writing ... [1000 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.111 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model12))
[1] 1000
> inspect(sort(model12[1:10], by = 'lift'))
     lhs                    rhs                    support     confidence coverage    lift       count
[1]  {BAWANG PUTIH}      => {BAWANG MERAH}       0.002008032 1.0000000  0.002008032 249.000000 2
[2]  {KACAMATA}          => {WIG}                0.002008032 0.6666667  0.003012048 166.000000 2
[3]  {PEPAYA}            => {NUGGET}             0.002008032 1.0000000  0.002008032  90.545455 2
[4]  {WEBCAM}            => {MONITOR}            0.002008032 0.6666667  0.003012048  83.000000 2
[5]  {NASI}              => {AYAM GORENG}        0.002008032 1.0000000  0.002008032  76.615385 2
[6]  {TEPUNG MAIZENA}    => {TEPUNG TERIGU}      0.002008032 1.0000000  0.002008032  71.142857 2
[7]  {SEBLAK}            => {MINUMAN}            0.002008032 0.6666667  0.003012048  20.121212 2
[8]  {PELEMBUT PAKAIAN} => {SABUN CUCI PAKAIAN} 0.002008032 0.6666667  0.003012048  17.473684 2
[9]  {BATAGOR}           => {TEH}                0.002008032 1.0000000  0.002008032   7.377778 2
[10] {KUACI}             => {TEH}                0.002008032 0.6666667  0.003012048   4.918519 2
```

Gambar 5.112 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

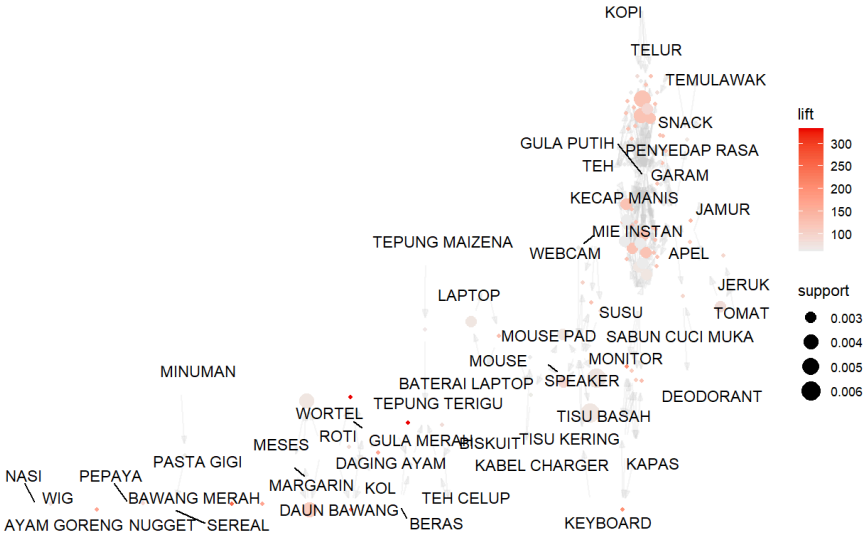
```
> summary(model12)
set of 1000 rules

rule length distribution (lhs + rhs):sizes
  2   3   4   5   6
 47 345 447 143  18

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   2.00    3.00    4.00    3.74    4.00    6.00

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.002008   Min.   :0.6000   Min.   :0.002008   Min.   :  3.515   Min.   : 2.000
 1st Qu.:0.002008   1st Qu.:0.6667   1st Qu.:0.002008   1st Qu.:  7.165   1st Qu.: 2.000
 Median :0.002008   Median :1.0000   Median :0.003012   Median : 20.750   Median : 2.000
 Mean   :0.002315   Mean   :0.8556   Mean   :0.002858   Mean   : 29.494   Mean   : 2.306
 3rd Qu.:0.002008   3rd Qu.:1.0000   3rd Qu.:0.003012   3rd Qu.: 38.308   3rd Qu.: 2.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.030120   Max.   :332.000   Max.   :19.000

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.002        0.6
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.002, confidence = 0.6))
```

Gambar 5.113 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model12,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 53 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.114 Output dari Pembuatan Graph [1]

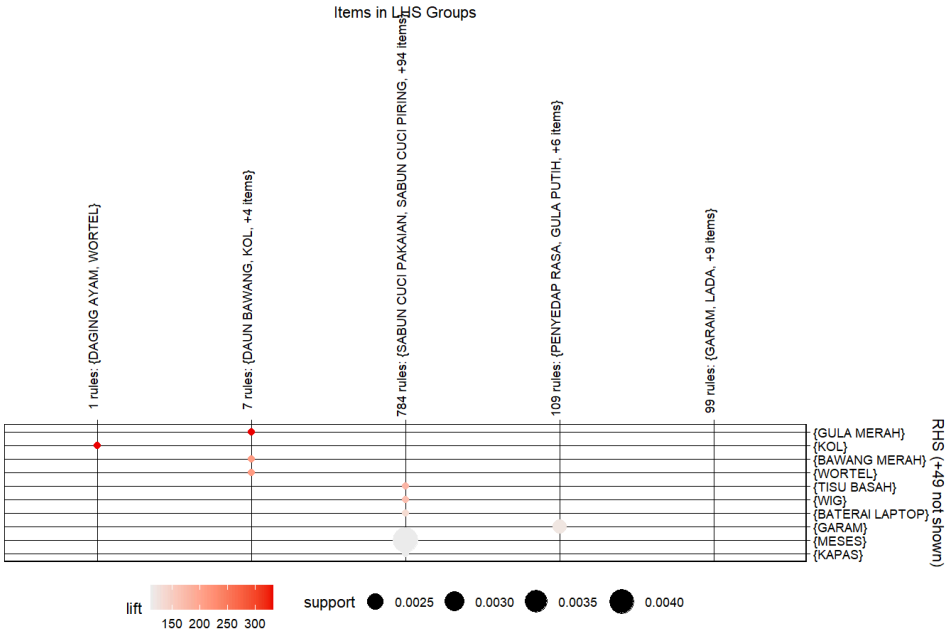


Gambar 5.115 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

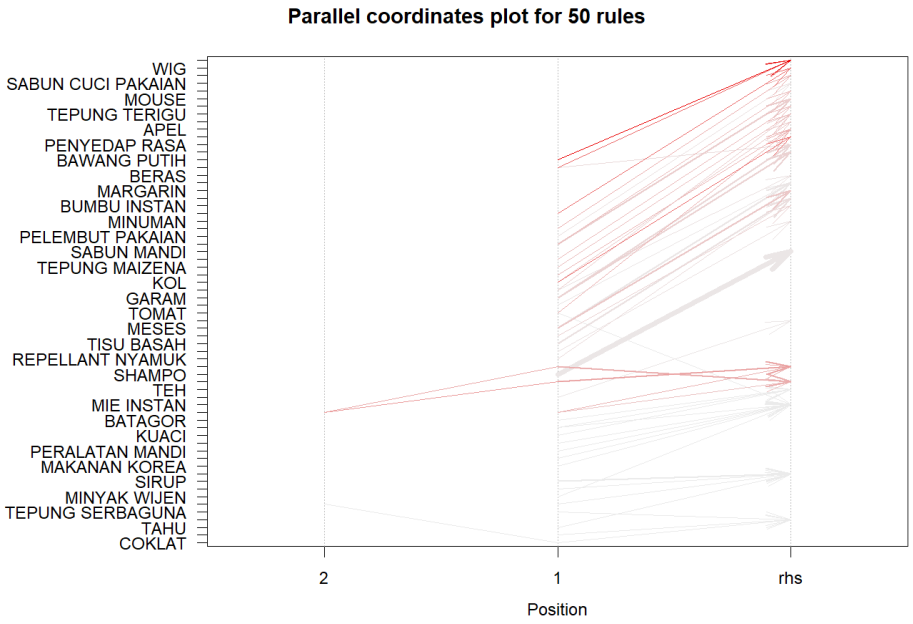
```
> plot(model12, method = "grouped", control = list(k = 5))
There were 12 warnings (use warnings() to see them)
```

Gambar 5.116 Output dari Pembuatan Plot 5 rules[1]



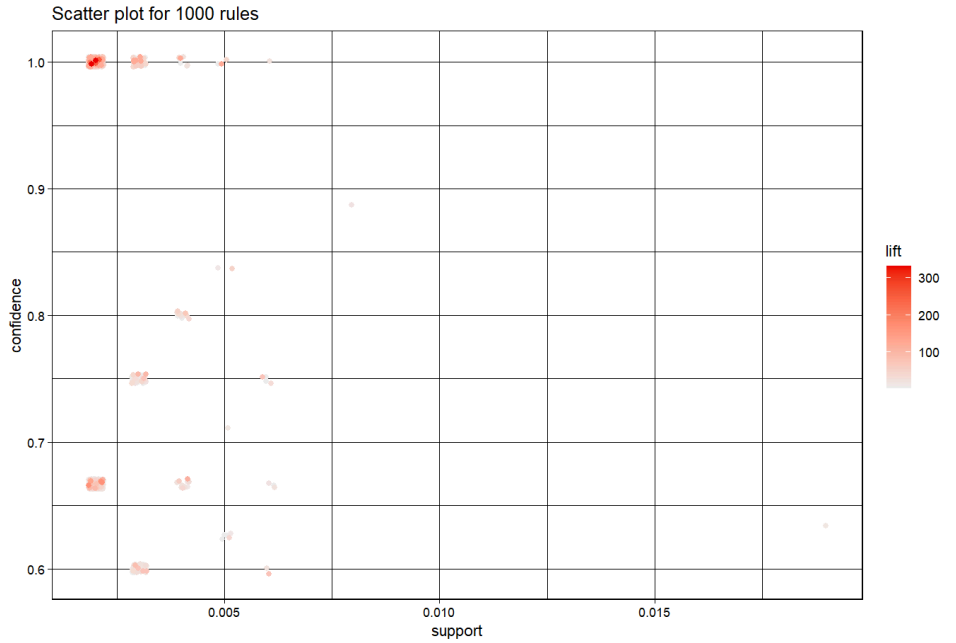
Gambar 5.117 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.118 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.119 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c( KEJU )
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model12, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "MIE INSTAN" "SNACK"      "ROTI"
```

Gambar 5.120 Hasil Prediksi

13.) Percobaan Ketiga Belas

Membuat model dengan parameter minlen = 2, support = 0.002, confident = 0.5. Hasilnya 1272 rules.

```
> model13 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.5)) #Percobaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.5    0.1    1 none FALSE            TRUE       5   0.002      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 1

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [192 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 done [0.00s].
writing ... [1272 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.121 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model13))
[1] 1272
> inspect(sort(model13[1:10], by = 'lift'))
     lhs                    rhs                     support     confidence coverage    lift       count
[1]  {BAWANG PUTIH}      => {BAWANG MERAH}       0.002008032 1.0000000  0.002008032 249.000000 2
[2]  {BAWANG MERAH}      => {BAWANG PUTIH}       0.002008032 0.5000000  0.004016064 249.000000 2
[3]  {KACAMATA}          => {WIG}                0.002008032 0.6666667  0.003012048 166.000000 2
[4]  {WIG}               => {KACAMATA}           0.002008032 0.5000000  0.004016064 166.000000 2
[5]  {NASI}              => {AYAM GORENG}        0.002008032 1.0000000  0.002008032  76.615385 2
[6]  {SEBLAK}            => {MINUMAN}            0.002008032 0.6666667  0.003012048  20.121212 2
[7]  {PELEMBUT PAKAIAN} => {SABUN CUCI PAKAIAN} 0.002008032 0.6666667  0.003012048  17.473684 2
[8]  {BATAGOR}           => {TEH}                0.002008032 1.0000000  0.002008032   7.377778 2
[9]  {KUACI}             => {TEH}                0.002008032 0.6666667  0.003012048   4.918519 2
[10] {MAYONNAISE}        => {SUSU}               0.002008032 0.5000000  0.004016064   3.582734 2
```

Gambar 5.122 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

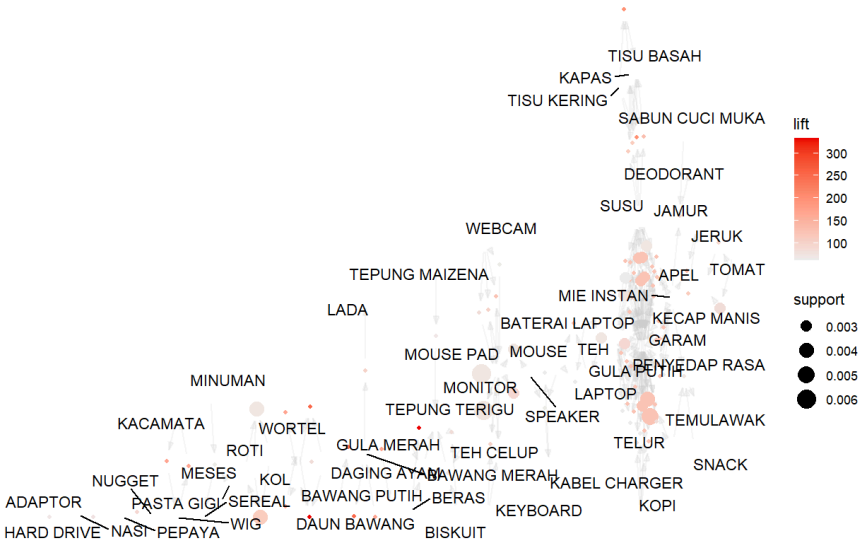
```
> summary(model13)
set of 1272 rules

rule length distribution (lhs + rhs):sizes
  2   3   4   5   6
 93 513 503 145  18

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   4.000   3.593   4.000   6.000

summary of quality measures:
    support           confidence        coverage             lift             count
 Min.   :0.002008   Min.   :0.5000   Min.   :0.002008   Min.   :  2.929   Min.   : 2.000
 1st Qu.:0.002008   1st Qu.:0.6000   1st Qu.:0.002008   1st Qu.:  7.165   1st Qu.: 2.000
 Median :0.002008   Median :0.6667   Median :0.003012   Median : 17.474   Median : 2.000
 Mean   :0.002358   Mean   :0.7802   Mean   :0.003311   Mean   : 26.840   Mean   : 2.349
 3rd Qu.:0.002008   3rd Qu.:1.0000   3rd Qu.:0.004016   3rd Qu.: 33.200   3rd Qu.: 2.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.030120   Max.   :332.000   Max.   :19.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.002        0.5

 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.002, confidence =
```

Gambar 5.123 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model13,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 56 unlabeled data points (too many overlaps). Consider increasing max.overlaps
>
```

Gambar 5.124 Output dari Pembuatan Graph [1]

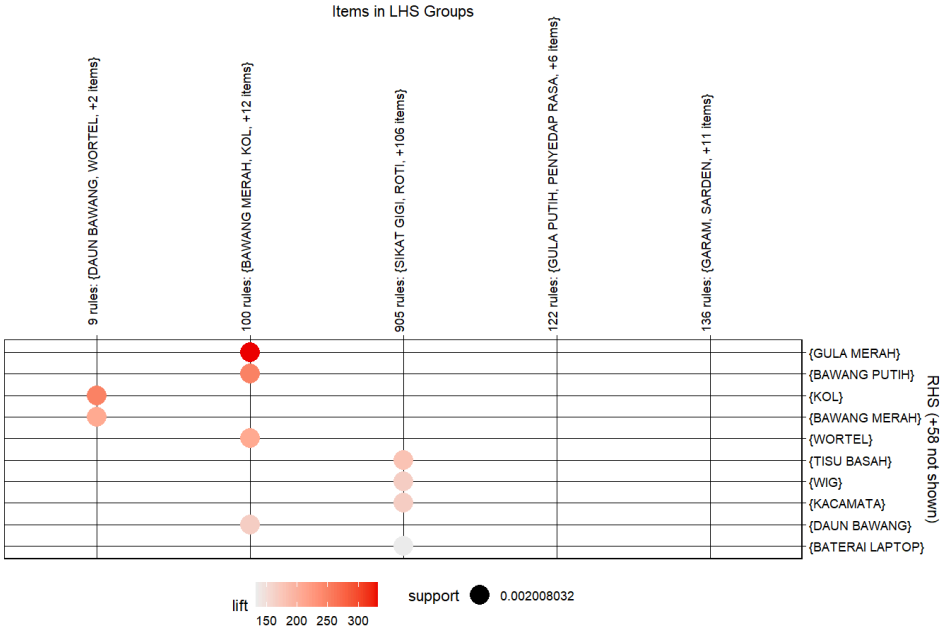


Gambar 5.125 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

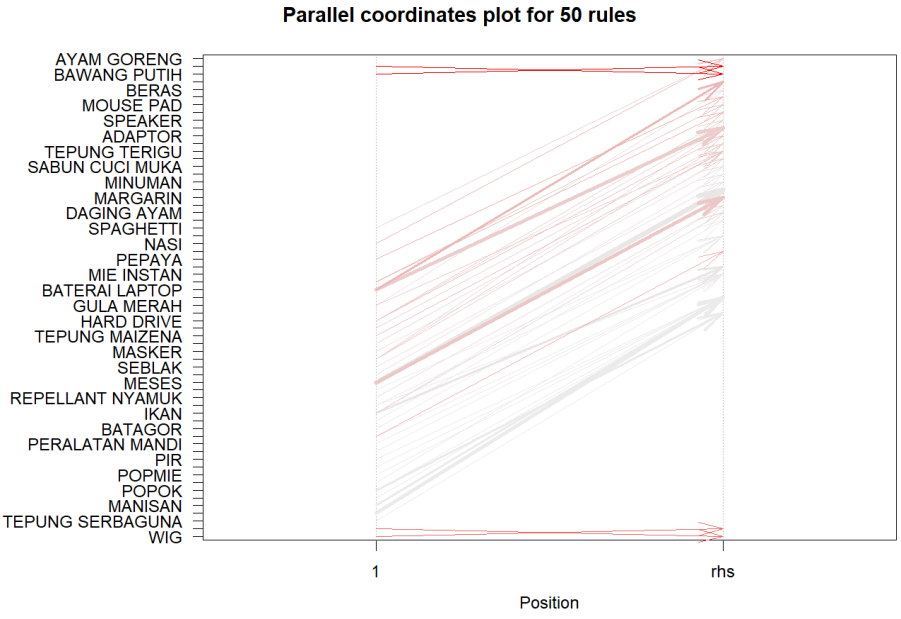
```
> plot(model13, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 53 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 53 unlabeled data points (too many overlaps). Consider increasing max.overlaps
3: ggrepel: 2 unlabeled data points (too many overlaps). Consider increasing max.overlaps
4: ggrepel: 2 unlabeled data points (too many overlaps). Consider increasing max.overlaps
>
```

Gambar 5.126 Output dari Pembuatan Plot 5 rules[1]



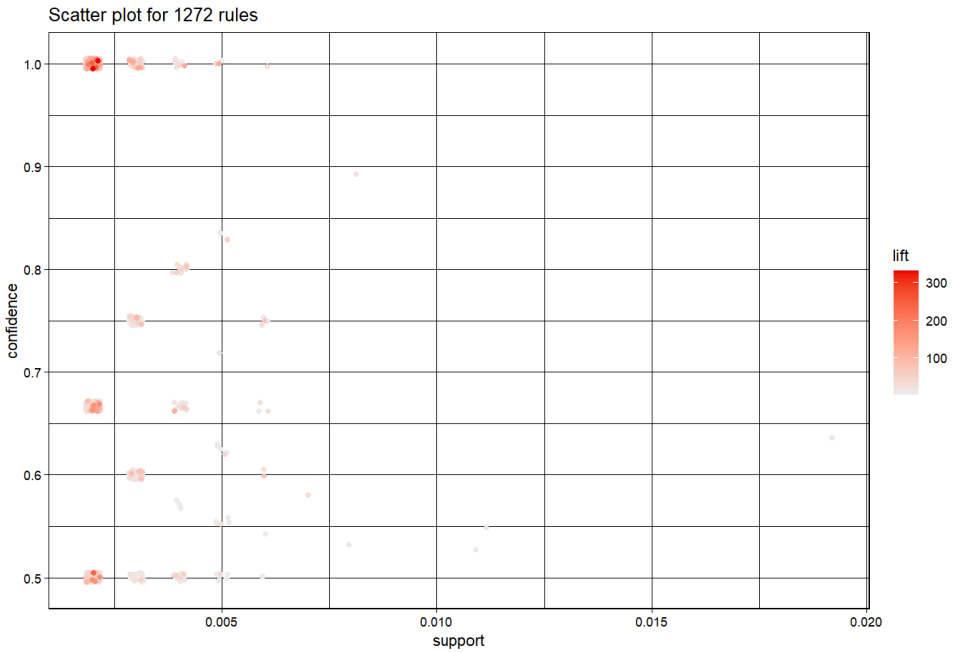
Gambar 5.127 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.128 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.129 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model13, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "MIE INSTAN" "SNACK"      "ROTI"       "SUSU"
```

Gambar 5.130 Hasil Prediksi

14.) Percobaan Keempat Belas

Membuat model dengan parameter minlen = 2, support = 0.003, confident = 0.7. Hasilnya 116 rules.

```
> model14 <- apriori(transaction_matrix, parameter = list(minlen=3,support = 0.003, confidence = 0.7)) #Percobaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.7    0.1    1 none FALSE            TRUE       5   0.003      3     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 2

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [148 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 done [0.00s].
writing ... [116 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.131 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model14))
[1] 116
> inspect(sort(model14[1:10], by = 'lift'))
     lhs                          rhs                 support     confidence coverage    lift      count
[1]  {MOUSE PAD, SPEAKER}     => {MONITOR}           0.003012048 0.7500000  0.004016064 93.375000 3
[2]  {MONITOR, SPEAKER}       => {MOUSE PAD}         0.003012048 0.7500000  0.004016064 74.700000 3
[3]  {MESES, ROTI}            => {MARGARIN}          0.004016064 0.8000000  0.005020080 72.436364 4
[4]  {GARAM, PENYEDAP RASA}   => {GULA PUTIH}        0.005020080 0.8333333  0.006024096 51.875000 5
[5]  {GARAM, GULA PUTIH}      => {PENYEDAP RASA}     0.005020080 1.0000000  0.005020080 45.272727 5
[6]  {MARGARIN, MESES}        => {ROTI}              0.004016064 1.0000000  0.004016064 17.172414 4
[7]  {SNACK, TEMULAWAK}       => {TELUR}             0.003012048 0.7500000  0.004016064 13.105263 3
[8]  {SEREAL, SNACK}          => {PERMEN}            0.003012048 0.7500000  0.004016064  9.960000 3
[9]  {TELUR, TEMULAWAK}       => {SNACK}             0.003012048 1.0000000  0.003012048  5.858824 3
[10] {PERMEN, SEREAL}         => {SNACK}             0.003012048 1.0000000  0.003012048  5.858824 3
>
```

Gambar 5.132 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

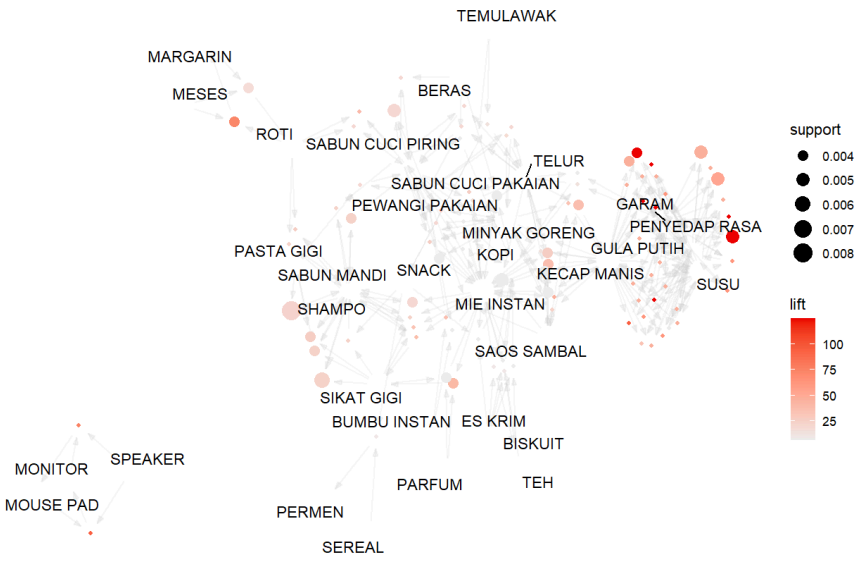
```
> summary(model14)
set of 116 rules

rule length distribution (lhs + rhs):sizes
 3  4  5
63 48  5

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
    3.0     3.0     3.0     3.5     4.0     5.0

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.003012   Min.   :0.7143   Min.   :0.003012   Min.   :  4.394   Min.   :3.000
 1st Qu.:0.003012   1st Qu.:0.7500   1st Qu.:0.003012   1st Qu.:  7.545   1st Qu.:3.000
 Median :0.003012   Median :1.0000   Median :0.004016   Median : 22.469   Median :3.000
 Mean   :0.003367   Mean   :0.8874   Mean   :0.003869   Mean   : 31.034   Mean   :3.353
 3rd Qu.:0.003012   3rd Qu.:1.0000   3rd Qu.:0.004016   3rd Qu.: 45.273   3rd Qu.:3.000
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :124.500   Max.   :8.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.003        0.7
                                                                                        call
 apriori(data = transaction_matrix, parameter = list(minlen = 3, support = 0.003, confidence = 0.7))
>
```

Gambar 5.133 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model14,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 33 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.134 Output dari Pembuatan Graph [1]

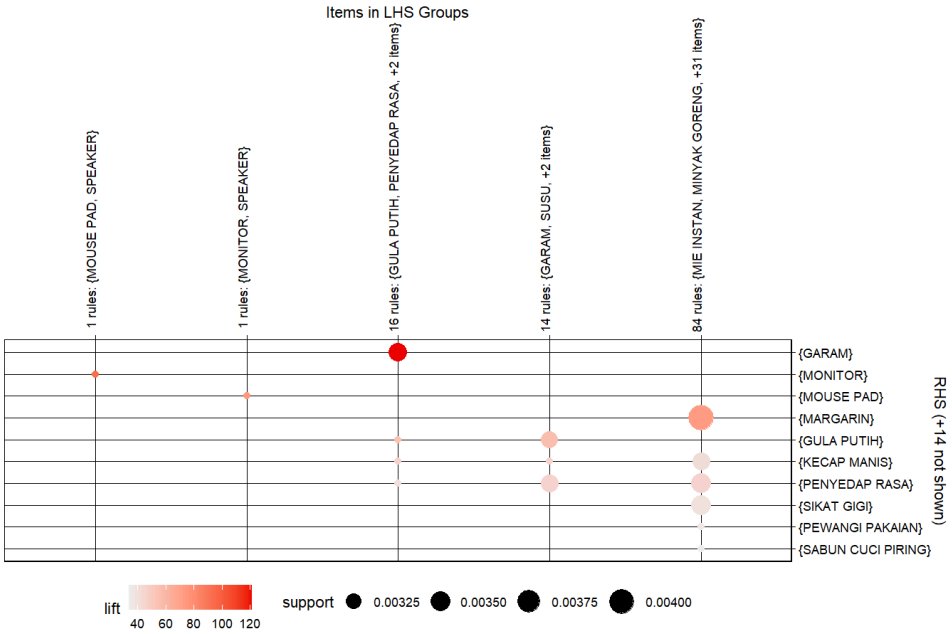


Gambar 5.135 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

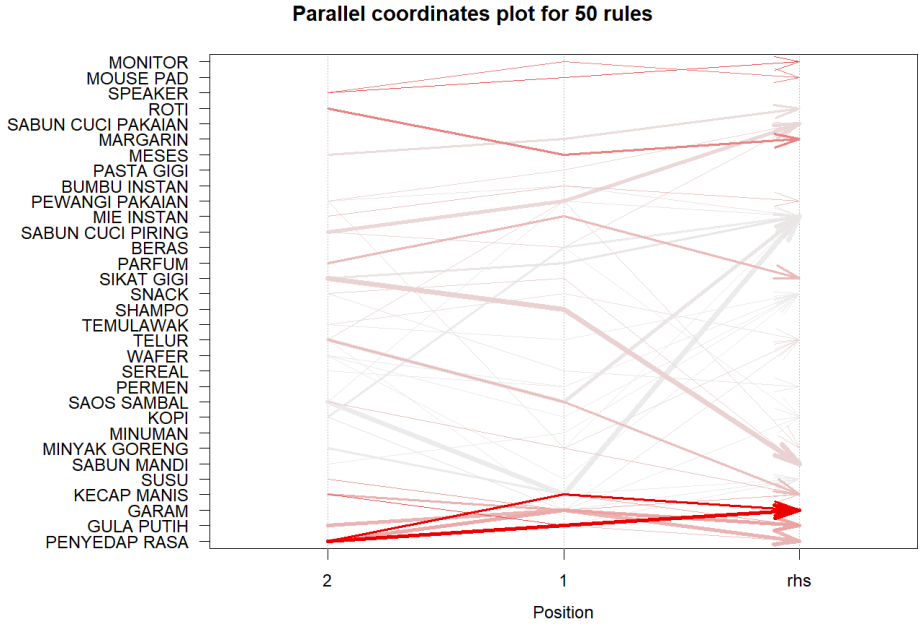
```
> plot(model14, method = "grouped", control = list(k = 5))
>
```

Gambar 5.136 Output dari Pembuatan Plot 5 rules[1]



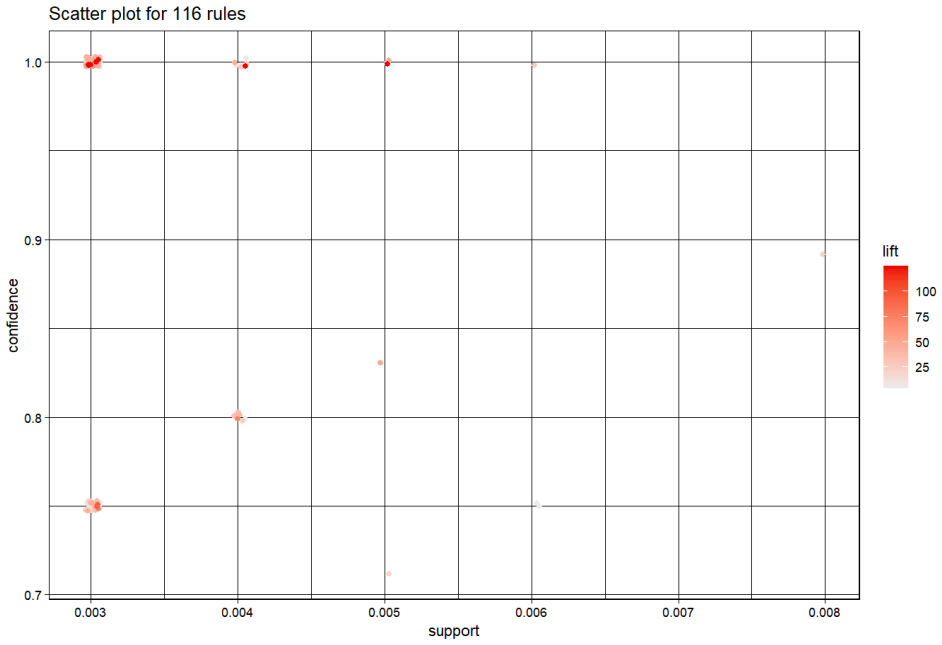
Gambar 5.137 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.138 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.139 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model14, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] ""
```

Gambar 5.140 Hasil Prediksi

15.) Percobaan Kelima Belas

Membuat model dengan parameter minlen = 2, support = 0.001, confident = 0.6. Hasilnya 980064 rules.

```
> model15 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.001, confidence = 0.6))
obaan = Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.6    0.1    1 none FALSE            TRUE       5   0.001      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 0

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [308 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 7 8 9 10 done [0.05s].
writing ... [980064 rule(s)] done [0.62s].
creating S4 object  ... done [0.34s].
Warning message:
In apriori(transaction_matrix, parameter = list(minlen = 2, support = 0.001,  :
  Mining stopped (maxlen reached). Only patterns up to a length of 10 returned!
```

Gambar 5.141 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model15))
[1] 980064
> inspect(sort(model15[1:10], by = 'lift'))
     lhs                 rhs              support     confidence coverage    lift  count
[1]  {PLESTER}         => {ANTISEPTIK}    0.001004016 1          0.001004016 996.0 1
[2]  {ANTISEPTIK}      => {PLESTER}       0.001004016 1          0.001004016 996.0 1
[3]  {BOLA}            => {RAKET TENIS}   0.001004016 1          0.001004016 996.0 1
[4]  {RAKET TENIS}     => {BOLA}          0.001004016 1          0.001004016 996.0 1
[5]  {KAOS KAKI}       => {SEPATU}        0.001004016 1          0.001004016 996.0 1
[6]  {CAIRAN SOFTLENS} => {LENSA KONTAK}  0.001004016 1          0.001004016 498.0 1
[7]  {SPREI}           => {HANDUK}        0.001004016 1          0.001004016 498.0 1
[8]  {TOPI}            => {WIG}           0.001004016 1          0.001004016 249.0 1
[9]  {KALUNG}          => {BAJU}          0.001004016 1          0.001004016 199.2 1
[10] {KERTAS}          => {TINTA}         0.001004016 1          0.001004016  83.0 1
```

Gambar 5.142 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

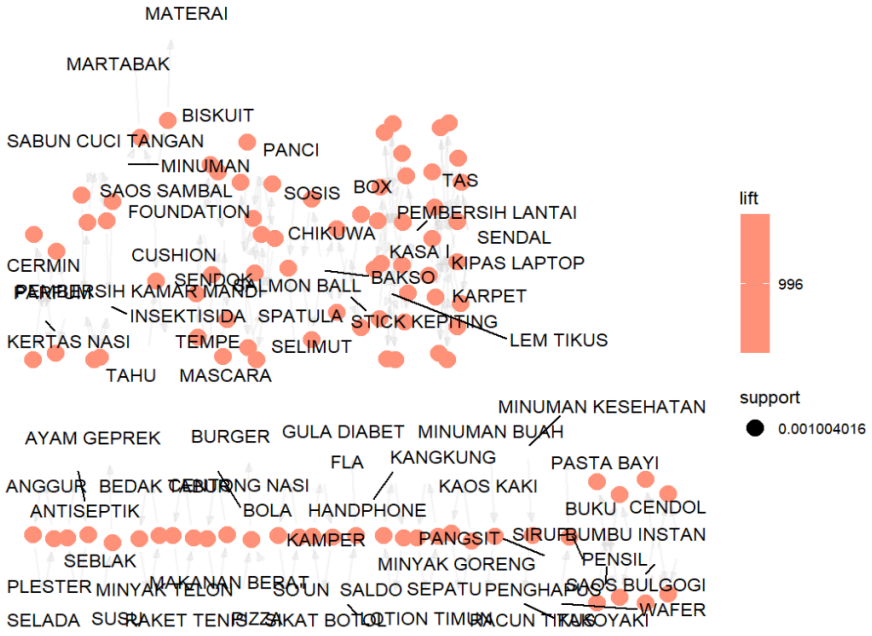
```
> summary(model15)
set of 980064 rules

rule length distribution (lhs + rhs):sizes
     2      3      4      5      6      7      8      9     10
   417   7062  25216  55589 101497 159089 209072 225522 196600

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   2.00    7.00    8.00    7.95    9.00   10.00

summary of quality measures:
    support           confidence        coverage             lift             count
 Min.   :0.001004   Min.   :0.6000   Min.   :0.001004   Min.   :  3.515   Min.   : 1.000
 1st Qu.:0.001004   1st Qu.:1.0000   1st Qu.:0.001004   1st Qu.: 24.900   1st Qu.: 1.000
 Median :0.001004   Median :1.0000   Median :0.001004   Median : 45.273   Median : 1.000
 Mean   :0.001005   Mean   :0.9999   Mean   :0.001006   Mean   :153.214   Mean   : 1.001
 3rd Qu.:0.001004   3rd Qu.:1.0000   3rd Qu.:0.001004   3rd Qu.:249.000   3rd Qu.: 1.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.030120   Max.   :996.000   Max.   :19.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.001        0.6
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.001, confidence = 0.6))
```

Gambar 5.143 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model15,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if neede
d).
2: ggrepel: 75 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.144 Output dari Pembuatan Graph [1]

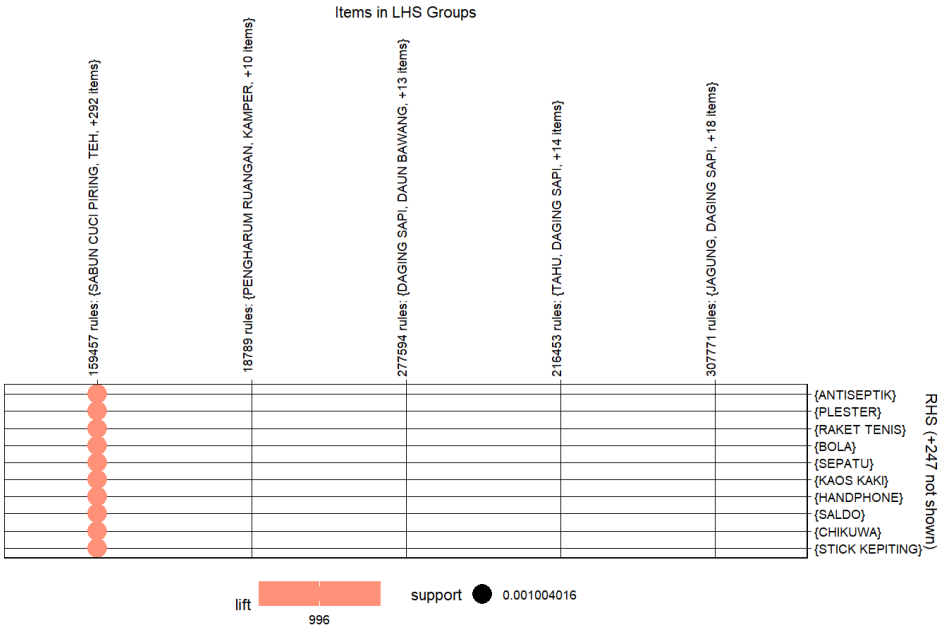


Gambar 5.145 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

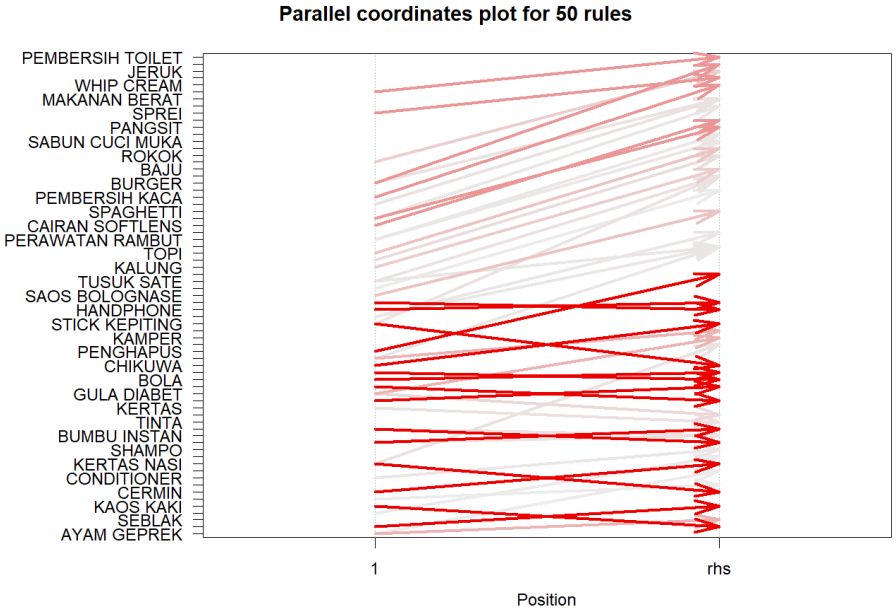
```
> plot(model15, method = "grouped", control = list(k = 5))
>
```

Gambar 5.146 Output dari Pembuatan Plot 5 rules[1]



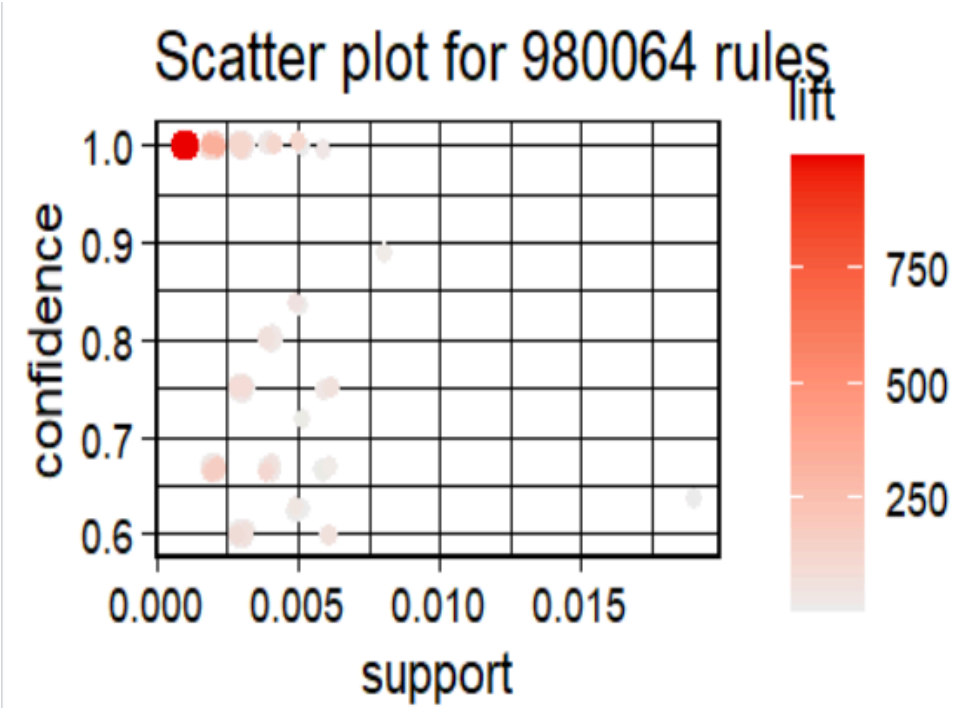
Gambar 5.147 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.148 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.149 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model15, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
 [1] "KOPI"                "SUSU"                "MIE INSTAN"           "SELADA"
 [5] "ANGGUR"              "TOMAT"               "JAMUR"                "APEL"
 [9] "TEH"                 "SELAI"               "TEPUNG MAIZENA"       "TEPUNG TERIGU"
[13] "MINYAK GORENG"       "AIR MINERAL BOTOL"   "BIHUN"                "POPCORN"
[17] "GAS"                 "ES KRIM"             "RUMPUT LAUT"          "SAUS TOMAT"
[21] "SOSIS"               "MINUMAN"             "SABUN CUCI PIRING"    "SABUN CUCI PAKAIAN"
[25] "ROTI"                "SNACK"               "MINUMAN BERKARBONASI" "SEMANGKA"
[29] "TELUR"               "PEMBERSIH LANTAI"    "SAOS TIRAM"           "PERMEN"
[33] "BISKUIT"             "WAFLE"               "MARGARIN"
>
```

Gambar 5.150 Hasil Prediksi

16.) Percobaan Keenam Belas

Membuat model dengan parameter minlen = 2, support = 0.002, confident = 0.9. Hasilnya 559 rules.

```
> model16 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.9)) #Percobaan
= Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.9    0.1    1 none FALSE            TRUE       5   0.002      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 1

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [192 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 done [0.00s].
writing ... [559 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
```

Gambar 5.151 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model16))
[1] 559
> inspect(sort(model16[1:10], by = 'lift'))
     lhs                    rhs              support     confidence coverage    lift       count
[1]  {BAWANG PUTIH}      => {BAWANG MERAH}  0.002008032 1          0.002008032 249.000000 2
[2]  {MONITOR, WEBCAM}   => {MOUSE PAD}      0.002008032 1          0.002008032  99.600000 2
[3]  {PEPAYA}            => {NUGGET}         0.002008032 1          0.002008032  90.545455 2
[4]  {NASI}              => {AYAM GORENG}    0.002008032 1          0.002008032  76.615385 2
[5]  {TEPUNG MAIZENA}    => {TEPUNG TERIGU}  0.002008032 1          0.002008032  71.142857 2
[6]  {REPELLANT NYAMUK}  => {TISU KERING}    0.002008032 1          0.002008032  26.918919 2
[7]  {PERALATAN MANDI}   => {MIE INSTAN}     0.002008032 1          0.002008032   7.545455 2
[8]  {BATAGOR}           => {TEH}            0.002008032 1          0.002008032   7.377778 2
[9]  {PIR}               => {SUSU}           0.002008032 1          0.002008032   7.165468 2
[10] {TEPUNG SERBAGUNA}  => {SNACK}          0.002008032 1          0.002008032   5.858824 2
>
```

Gambar 5.152 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

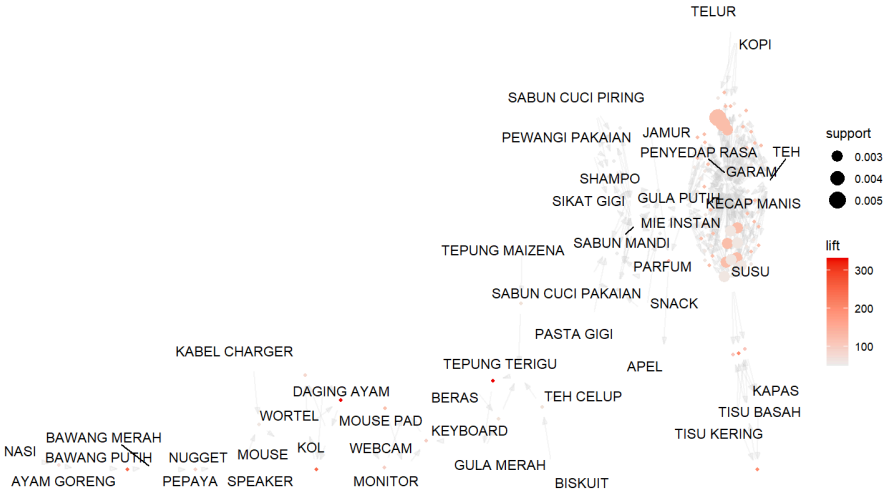
```
> summary(model16)
set of 559 rules

rule length distribution (lhs + rhs):sizes
  2   3   4   5   6
  9 153 269 112  16

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   4.000   3.952   4.000   6.000

summary of quality measures:
    support           confidence    coverage            lift            count
 Min.   :0.002008   Min.   :1    Min.   :0.002008   Min.   :  5.859   Min.   :2.000
 1st Qu.:0.002008   1st Qu.:1    1st Qu.:0.002008   1st Qu.:  7.545   1st Qu.:2.000
 Median :0.002008   Median :1    Median :0.002008   Median : 26.210   Median :2.000
 Mean   :0.002146   Mean   :1    Mean   :0.002146   Mean   : 37.080   Mean   :2.138
 3rd Qu.:0.002008   3rd Qu.:1    3rd Qu.:0.002008   3rd Qu.: 45.273   3rd Qu.:2.000
 Max.   :0.006024   Max.   :1    Max.   :0.006024   Max.   :332.000   Max.   :6.000

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.002        0.9
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.002, confidence = 0.9))
```

Gambar 5.153 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model16,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 45 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.154 Output dari Pembuatan Graph [1]

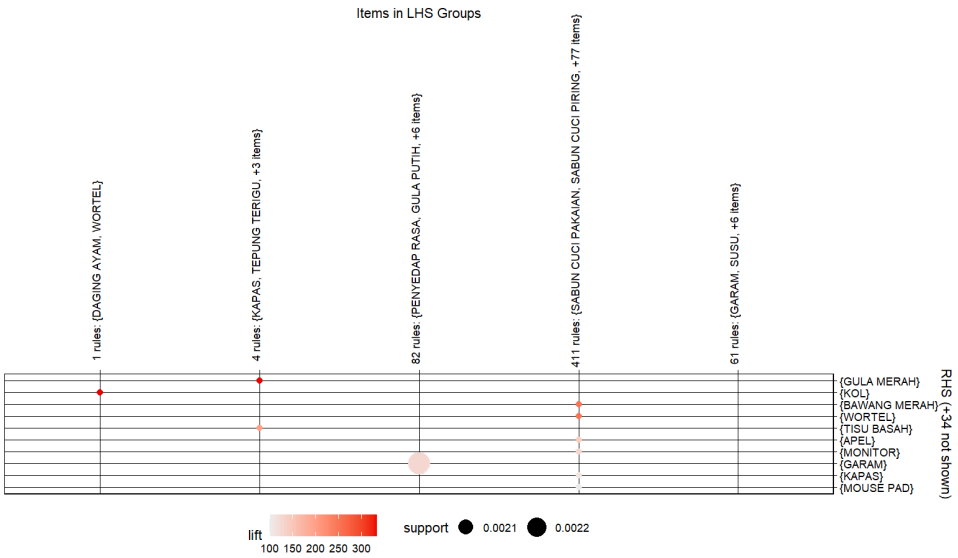


Gambar 5.155 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

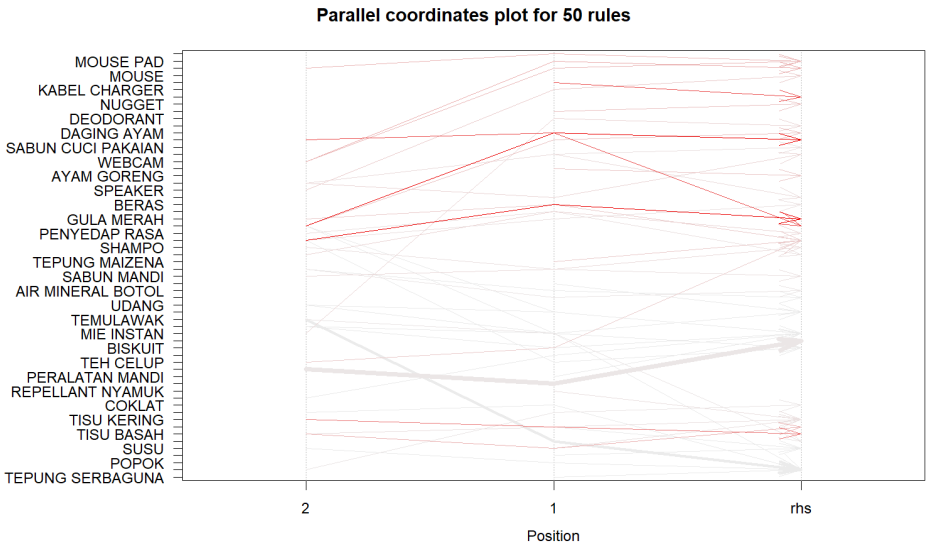
```
> plot(model16, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 43 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 43 unlabeled data points (too many overlaps). Consider increasing max.overlaps
>
```

Gambar 5.156 Output dari Pembuatan Plot 5 rules[1]



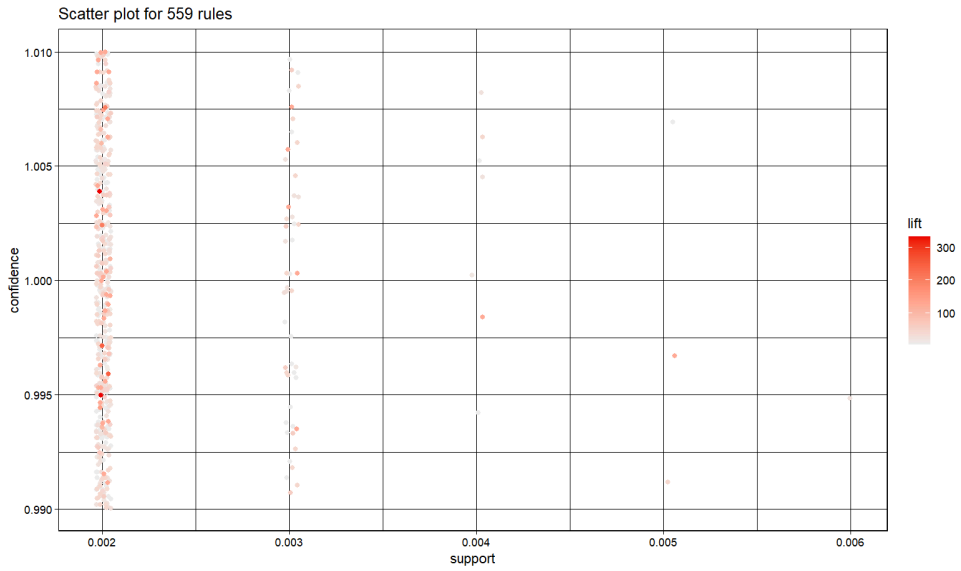
Gambar 5.157 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.158 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.159 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model16, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "SNACK"      "ROTI"       "MIE INSTAN"
>
```

Gambar 5.160 Hasil Prediksi

17.) Percobaan Ketujuh Belas

Membuat model dengan parameter minlen = 2, support = 0.001, confident = 0.5. Hasilnya 985914 rules.

```
> model17 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.001, confidence = 0.5)) #Percobaar
= Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.5    0.1    1 none FALSE            TRUE       5   0.001      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 0

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [308 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 7 8 9 10 done [0.04s].
writing ... [985914 rule(s)] done [0.54s].
creating S4 object  ... done [0.33s].
Warning message:
In apriori(transaction_matrix, parameter = list(minlen = 2, support = 0.001,  :
  Mining stopped (maxlen reached). Only patterns up to a length of 10 returned!
```

Gambar 5.161 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model17))
[1] 985914
> inspect(sort(model17[1:10], by = 'lift'))
     lhs                  rhs                 support     confidence coverage    lift  count
[1]  {PLESTER}         => {ANTISEPTIK}       0.001004016 1.0        0.001004016 996.0 1
[2]  {ANTISEPTIK}      => {PLESTER}          0.001004016 1.0        0.001004016 996.0 1
[3]  {BOLA}            => {RAKET TENIS}      0.001004016 1.0        0.001004016 996.0 1
[4]  {RAKET TENIS}     => {BOLA}             0.001004016 1.0        0.001004016 996.0 1
[5]  {CAIRAN SOFTLENS} => {LENSA KONTAK}     0.001004016 1.0        0.001004016 498.0 1
[6]  {LENSA KONTAK}    => {CAIRAN SOFTLENS}  0.001004016 0.5        0.002008032 498.0 1
[7]  {SPREI}           => {HANDUK}           0.001004016 1.0        0.001004016 498.0 1
[8]  {HANDUK}          => {SPREI}            0.001004016 0.5        0.002008032 498.0 1
[9]  {KALUNG}          => {BAJU}             0.001004016 1.0        0.001004016 199.2 1
[10] {KERTAS}          => {TINTA}            0.001004016 1.0        0.001004016  83.0 1
>
```

Gambar 5.162 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

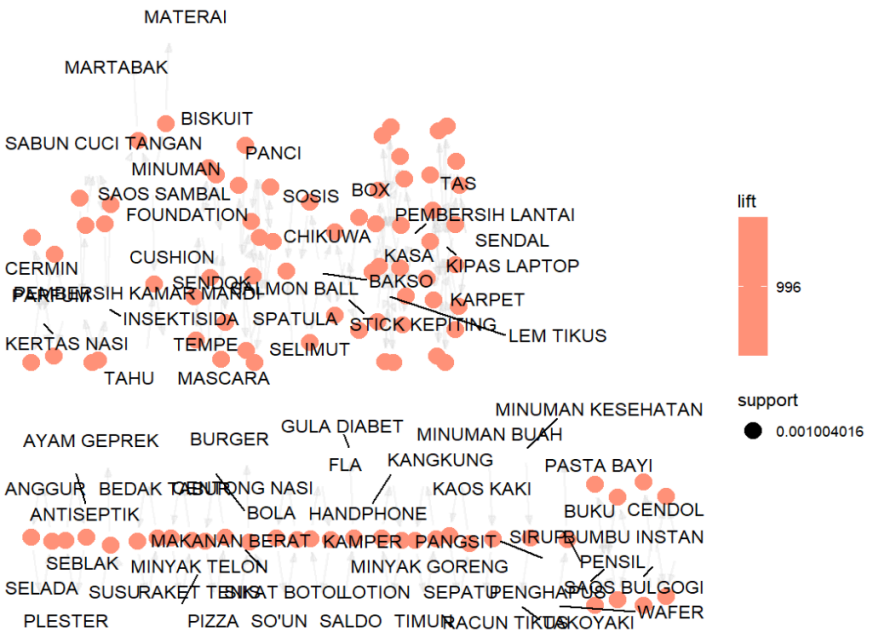
```
> summary(model17)
set of 985914 rules

rule length distribution (lhs + rhs):sizes
     2      3      4      5      6      7      8      9     10
   707   8965  27576  56630 101725 159117 209072 225522 196600

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   7.000   8.000   7.926   9.000  10.000

summary of quality measures:
    support           confidence        coverage             lift             count
 Min.   :0.001004   Min.   :0.5000   Min.   :0.001004   Min.   :  2.929   Min.   : 1.000
 1st Qu.:0.001004   1st Qu.:1.0000   1st Qu.:0.001004   1st Qu.: 24.293   1st Qu.: 1.000
 Median :0.001004   Median :1.0000   Median :0.001004   Median : 45.273   Median : 1.000
 Mean   :0.001006   Mean   :0.9969   Mean   :0.001013   Mean   :152.674   Mean   : 1.002
 3rd Qu.:0.001004   3rd Qu.:1.0000   3rd Qu.:0.001004   3rd Qu.:249.000   3rd Qu.: 1.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.030120   Max.   :996.000   Max.   :19.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.001        0.5
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.001, confidence = 0.5))
```

Gambar 5.163 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model17,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if neede
d).
2: ggrepel: 75 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.164 Output dari Pembuatan Graph [1]

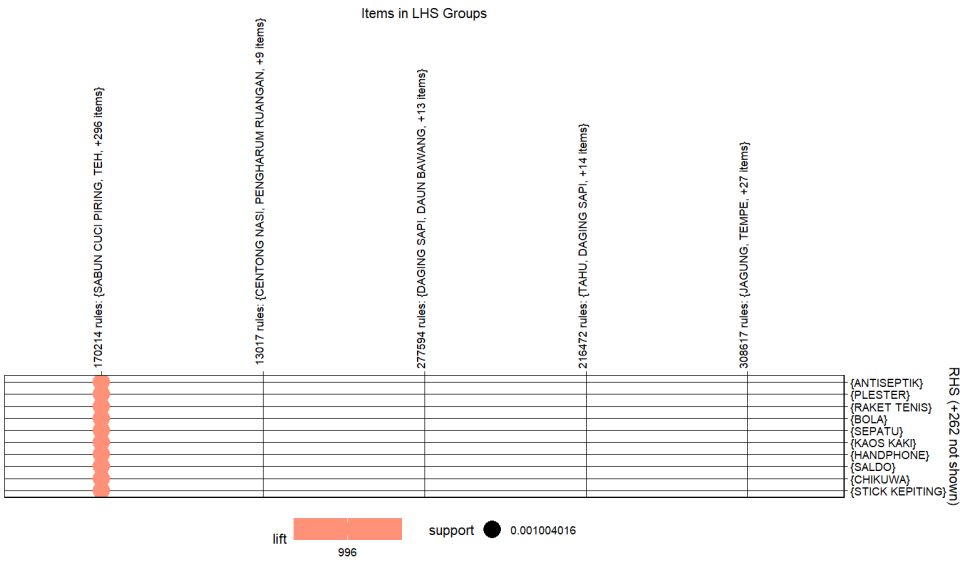


Gambar 5.165 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

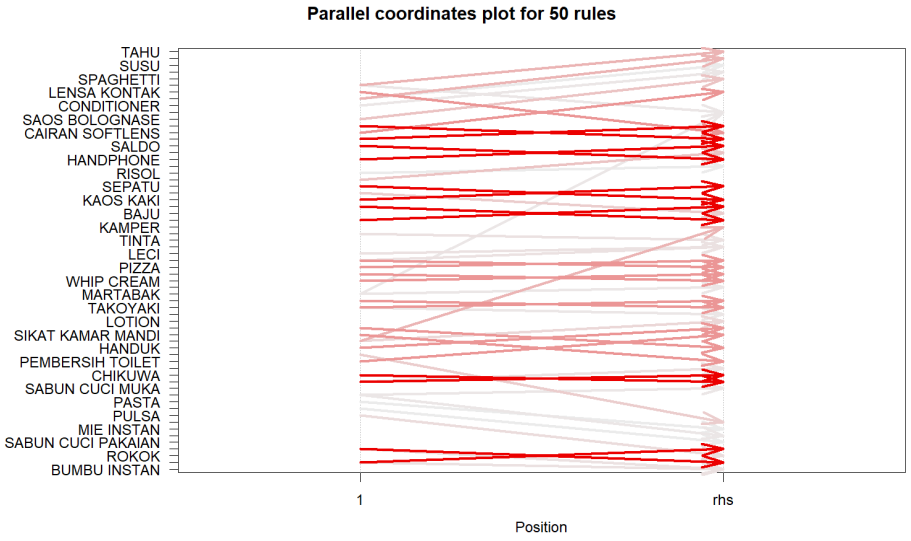
```
> plot(model17, method = "grouped", control = list(k = 5))
>
```

Gambar 5.166 Output dari Pembuatan Plot 5 rules[1]



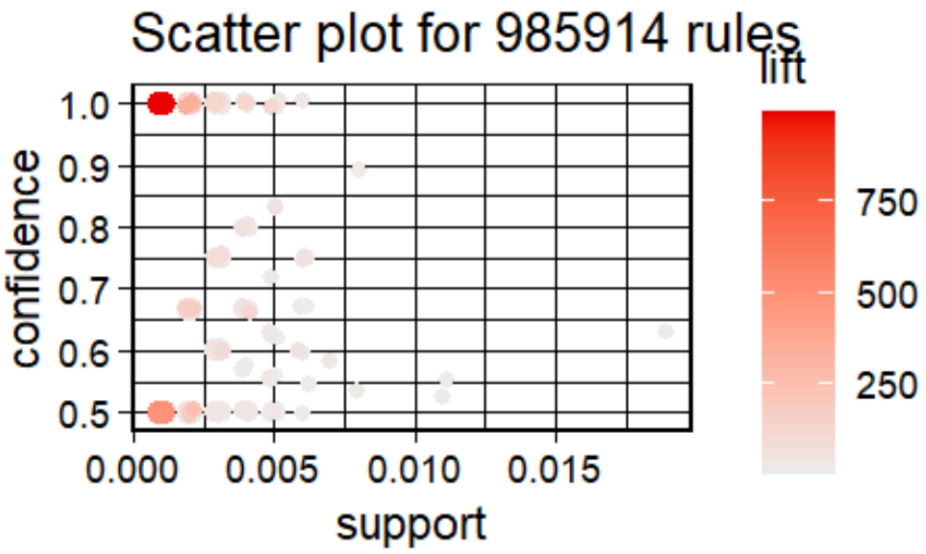
Gambar 5.167 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.168 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.169 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model17, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
 [1] "KOPI"                "WAFLE"               "SUSU"                "MIE INSTAN"
 [5] "SELADA"              "ANGGUR"              "TOMAT"               "JAMUR"
 [9] "APEL"                "TEH"                 "SELAI"               "TEPUNG MAIZENA"
[13] "TEPUNG TERIGU"       "MINYAK GORENG"       "AIR MINERAL BOTOL"   "BIHUN"
[17] "POPCORN"             "GAS"                 "ES KRIM"             "RUMPUT LAUT"
[21] "SAUS TOMAT"          "SOSIS"               "MINUMAN"             "SABUN CUCI PIRING"
[25] "SABUN CUCI PAKAIAN"  "ROTI"                "SNACK"               "MINUMAN BERKARBONASI"
[29] "SEMANGKA"            "TELUR"               "PEMBERSIH LANTAI"    "SAOS TIRAM"
[33] "PERMEN"              "BISKUIT"             "MARGARIN"
```

Gambar 5.170 Hasil Prediksi

18.) Percobaan Kedelapan Belas

Membuat model dengan parameter minlen = 2, support = 0.001, confident = 0.4. Hasilnya 986112 rules.

```
> model18 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.001, confidence = 0.4)) #Percobaan
= Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.4    0.1    1 none FALSE            TRUE       5   0.001      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 0

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [308 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 7 8 9 10 done [0.04s].
writing ... [986112 rule(s)] done [0.54s].
creating S4 object  ... done [0.34s].
Warning message:
In apriori(transaction_matrix, parameter = list(minlen = 2, support = 0.001,  :
  Mining stopped (maxlen reached). Only patterns up to a length of 10 returned!
>
```

Gambar 5.171 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model18))
[1] 986112
> inspect(sort(model18[1:10], by = 'lift'))
     lhs                 rhs                 support     confidence coverage    lift  count
[1]  {PLESTER}         => {ANTISEPTIK}      0.001004016 1.0        0.001004016 996.0 1
[2]  {ANTISEPTIK}      => {PLESTER}         0.001004016 1.0        0.001004016 996.0 1
[3]  {BOLA}            => {RAKET TENIS}     0.001004016 1.0        0.001004016 996.0 1
[4]  {RAKET TENIS}     => {BOLA}            0.001004016 1.0        0.001004016 996.0 1
[5]  {CAIRAN SOFTLENS} => {LENSA KONTAK}    0.001004016 1.0        0.001004016 498.0 1
[6]  {LENSA KONTAK}    => {CAIRAN SOFTLENS} 0.001004016 0.5        0.002008032 498.0 1
[7]  {SPREI}           => {HANDUK}          0.001004016 1.0        0.001004016 498.0 1
[8]  {HANDUK}          => {SPREI}           0.001004016 0.5        0.002008032 498.0 1
[9]  {KALUNG}          => {BAJU}            0.001004016 1.0        0.001004016 199.2 1
[10] {KERTAS}          => {TINTA}           0.001004016 1.0        0.001004016  83.0 1
>
```

Gambar 5.172 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

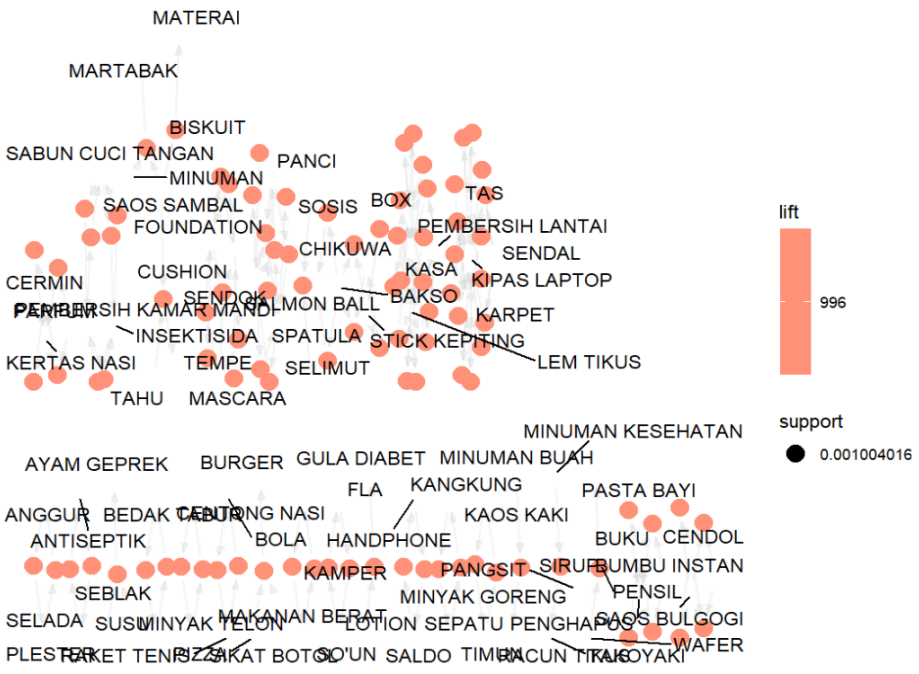
```
> summary(model18)
set of 986112 rules

rule length distribution (lhs + rhs):sizes
     2      3      4      5      6      7      8      9     10
   747   9088  27611  56630 101725 159117 209072 225522 196600

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   7.000   8.000   7.925   9.000  10.000

summary of quality measures:
    support           confidence        coverage             lift             count
 Min.   :0.001004   Min.   :0.4000   Min.   :0.001004   Min.   :  2.344   Min.   : 1.000
 1st Qu.:0.001004   1st Qu.:1.0000   1st Qu.:0.001004   1st Qu.: 24.293   1st Qu.: 1.000
 Median :0.001004   Median :1.0000   Median :0.001004   Median : 45.273   Median : 1.000
 Mean   :0.001006   Mean   :0.9968   Mean   :0.001014   Mean   :152.645   Mean   : 1.002
 3rd Qu.:0.001004   3rd Qu.:1.0000   3rd Qu.:0.001004   3rd Qu.:249.000   3rd Qu.: 1.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.041165   Max.   :996.000   Max.   :19.000

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.001        0.4
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.001, confidence = 0.4))
```

Gambar 5.173 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model18,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if nee
d).
2: ggrepel: 75 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.174 Output dari Pembuatan Graph [1]

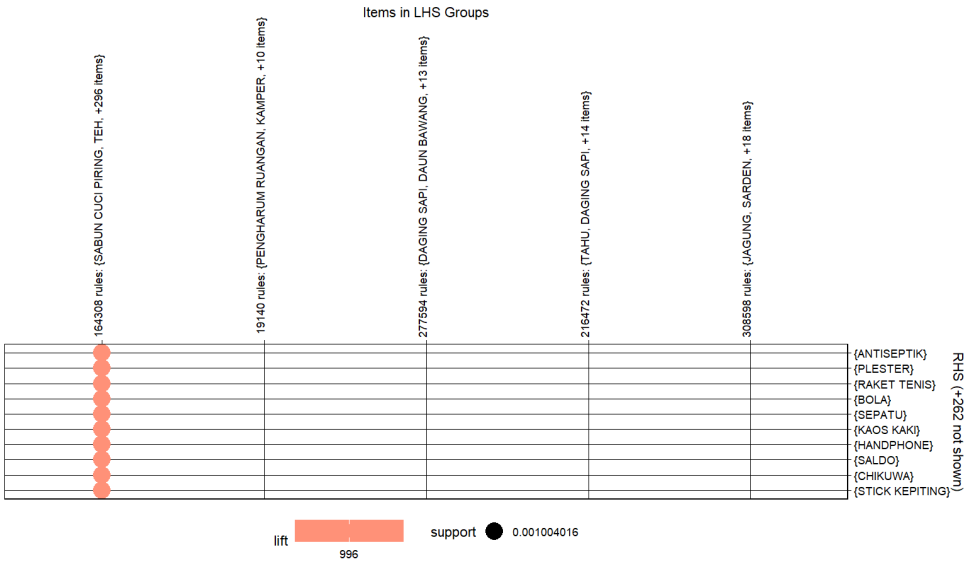


Gambar 5.175 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

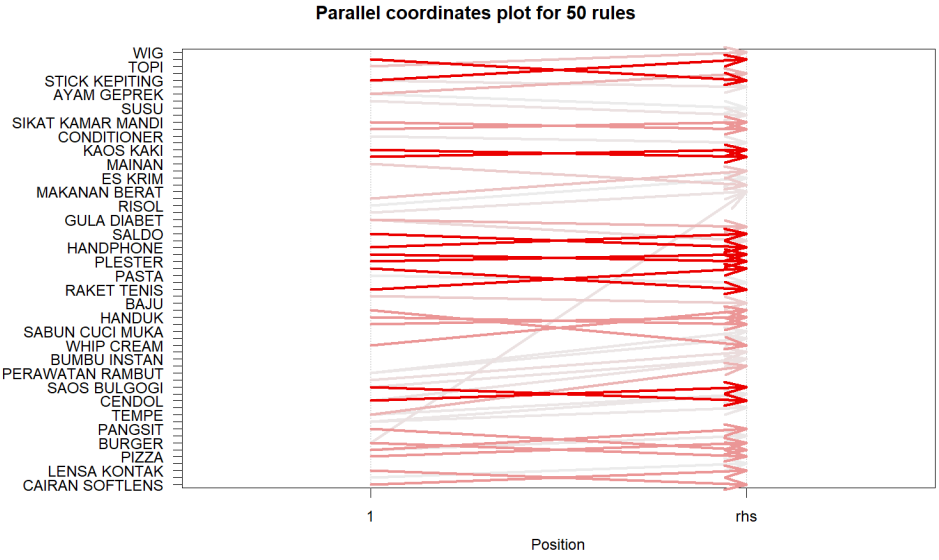
```
> plot(model18, method = "grouped", control = list(k = 5))
```

Gambar 5.176 Output dari Pembuatan Plot 5 rules[1]



Gambar 5.177 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.178 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot

Gambar 5.179 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model18, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
 [1] "MIE INSTAN"           "KOPI"                "WAFLE"               "SUSU"
 [5] "SELADA"               "ANGGUR"              "TOMAT"               "JAMUR"
 [9] "APEL"                 "TEH"                 "SELAI"               "TEPUNG MAIZENA"
[13] "TEPUNG TERIGU"        "MINYAK GORENG"       "AIR MINERAL BOTOL"   "BIHUN"
[17] "POPCORN"              "GAS"                 "ES KRIM"             "RUMPUT LAUT"
[21] "SAUS TOMAT"           "SOSIS"               "MINUMAN"             "SABUN CUCI PIRING"
[25] "SABUN CUCI PAKAIAN"   "ROTI"                "SNACK"               "MINUMAN BERKARBONASI"
[29] "SEMANGKA"             "TELUR"               "PEMBERSIH LANTAI"    "SAOS TIRAM"
[33] "PERMEN"               "BISKUIT"             "MARGARIN"
```

Gambar 5.180 Hasil Prediksi

19.) Percobaan Kesembilan Belas

Membuat model dengan parameter minlen = 2, support = 0.002, confident = 0.8. Hasilnya 575 rules.

```
> model19 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.8)) #Percobaan
= Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.8    0.1    1 none FALSE            TRUE       5   0.002      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 1

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [192 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 done [0.00s].
writing ... [575 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
>
```

Gambar 5.181 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model19))
[1] 575
> inspect(sort(model19[1:10], by = 'lift'))
     lhs                    rhs              support     confidence coverage    lift       count
[1]  {BAWANG PUTIH}      => {BAWANG MERAH}  0.002008032 1.0        0.002008032 249.000000 2
[2]  {PEPAYA}            => {NUGGET}        0.002008032 1.0        0.002008032  90.545455 2
[3]  {NASI}              => {AYAM GORENG}   0.002008032 1.0        0.002008032  76.615385 2
[4]  {TEPUNG MAIZENA}    => {TEPUNG TERIGU} 0.002008032 1.0        0.002008032  71.142857 2
[5]  {BATERAI LAPTOP}    => {MOUSE}         0.004016064 0.8        0.005020080  49.800000 4
[6]  {REPELLANT NYAMUK}  => {TISU KERING}   0.002008032 1.0        0.002008032  26.918919 2
[7]  {BATAGOR}           => {TEH}           0.002008032 1.0        0.002008032   7.377778 2
[8]  {PIR}               => {SUSU}          0.002008032 1.0        0.002008032   7.165468 2
[9]  {TEPUNG SERBAGUNA}  => {SNACK}         0.002008032 1.0        0.002008032   5.858824 2
[10] {SIRUP}             => {SUSU}          0.004016064 0.8        0.005020080   5.732374 4
>
```

Gambar 5.182 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

```
> summary(model19)
set of 575 rules

rule length distribution (lhs + rhs):sizes
  2   3   4   5   6
 13 162 272 112  16

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   3.000   4.000   3.923   4.000   6.000

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.002008   Min.   :0.8000   Min.   :0.002008   Min.   :  5.732   Min.   :2.0
 1st Qu.:0.002008   1st Qu.:1.0000   1st Qu.:0.002008   1st Qu.:  7.545   1st Qu.:2.0
 Median :0.002008   Median :1.0000   Median :0.002008   Median : 26.210   Median :2.0
 Mean   :0.002209   Mean   :0.9947   Mean   :0.002237   Mean   : 36.810   Mean   :2.2
 3rd Qu.:0.002008   3rd Qu.:1.0000   3rd Qu.:0.002008   3rd Qu.: 45.273   3rd Qu.:2.0
 Max.   :0.008032   Max.   :1.0000   Max.   :0.009036   Max.   :332.000   Max.   :8.0

mining info:
             data ntransactions support confidence
 transaction_matrix           996   0.002        0.8
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.002, confidence = 0.8))
```

Gambar 5.183 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

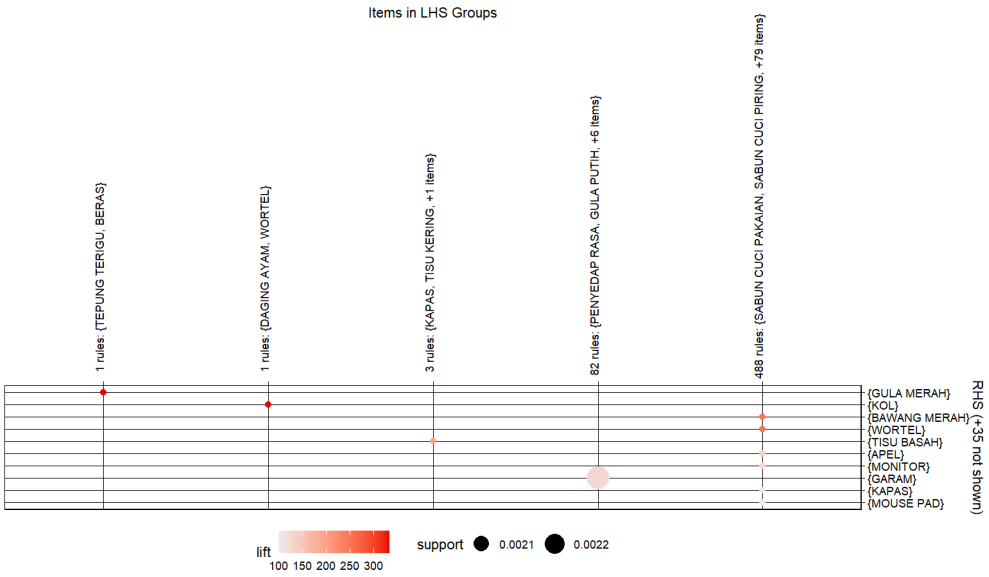
```
> plot(sort(model19,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 49 unlabeled data points (too many overlaps). Consider increasing max.overlaps
>
```

Gambar 5.184 Output dari Pembuatan Graph [1]

```
> plot(model19, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 46 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 46 unlabeled data points (too many overlaps). Consider increasing max.overlaps
>
```

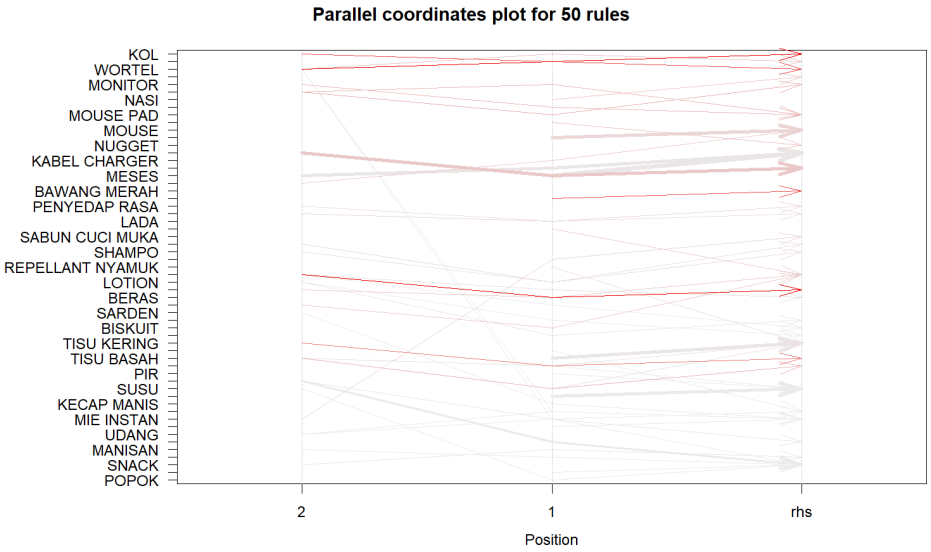
Gambar 5.185 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.



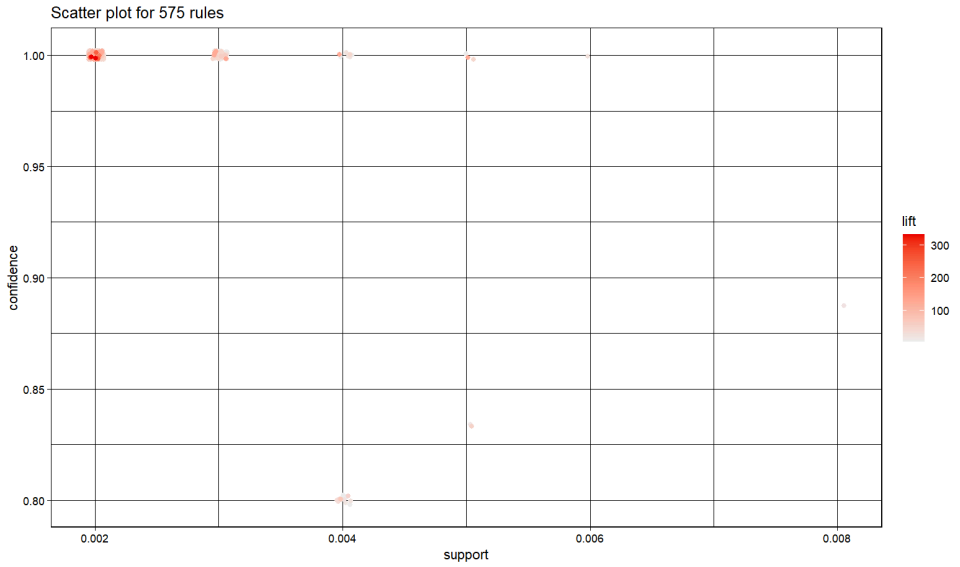
Gambar 5.186 Output dari Pembuatan Plot 5 rules[1]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.188 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.189 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model19, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "SNACK"      "ROTI"       "MIE INSTAN"
```

Gambar 5.190 Hasil Prediksi

20.) Percobaan Kedua Puluh

Membuat model dengan parameter minlen = 2, support = 0.002, confident = 0.4. Hasilnya 1470 rules.

```
> model20 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.4)) #Percobaan
= Rules
Apriori

Parameter specification:
 confidence minval smax arem  aval originalSupport maxtime support minlen maxlen target  ext
        0.4    0.1    1 none FALSE            TRUE       5   0.002      2     10  rules TRUE

Algorithmic control:
 filter tree heap memopt load sort verbose
    0.1 TRUE TRUE  FALSE TRUE    2    TRUE

Absolute minimum support count: 1

set item appearances ...[0 item(s)] done [0.00s].
set transactions ...[308 item(s), 996 transaction(s)] done [0.00s].
sorting and recoding items ... [192 item(s)] done [0.00s].
creating transaction tree ... done [0.00s].
checking subsets of size 1 2 3 4 5 6 done [0.00s].
writing ... [1470 rule(s)] done [0.00s].
creating S4 object  ... done [0.00s].
>
```

Gambar 5.191 Output dari Pembuatan Model 1 dengan Algoritma Apriori [1]

Menampilkan hasilnya.

```
> print(length(model20))
[1] 1470
> inspect(sort(model20[1:10], by = 'lift'))
     lhs                   rhs                   support     confidence coverage    lift       count
[1]  {BAWANG PUTIH}     => {BAWANG MERAH}       0.002008032 1.0000000  0.002008032 249.000000 2
[2]  {BAWANG MERAH}     => {BAWANG PUTIH}       0.002008032 0.5000000  0.004016064 249.000000 2
[3]  {KACAMATA}         => {WIG}                0.002008032 0.6666667  0.003012048 166.000000 2
[4]  {WIG}              => {KACAMATA}           0.002008032 0.5000000  0.004016064 166.000000 2
[5]  {NASI}             => {AYAM GORENG}        0.002008032 1.0000000  0.002008032  76.615385 2
[6]  {SEBLAK}           => {MINUMAN}            0.002008032 0.6666667  0.003012048  20.121212 2
[7]  {PELEMBUT PAKAIAN} => {SABUN CUCI PAKAIAN} 0.002008032 0.6666667  0.003012048  17.473684 2
[8]  {BATAGOR}          => {TEH}                0.002008032 1.0000000  0.002008032   7.377778 2
[9]  {KUACI}            => {TEH}                0.002008032 0.6666667  0.003012048   4.918519 2
[10] {MAYONNAISE}       => {SUSU}               0.002008032 0.5000000  0.004016064   3.582734 2
>
```

Gambar 5.192 Output dari Pembuatan Model 1 dengan Algoritma Apriori [2]

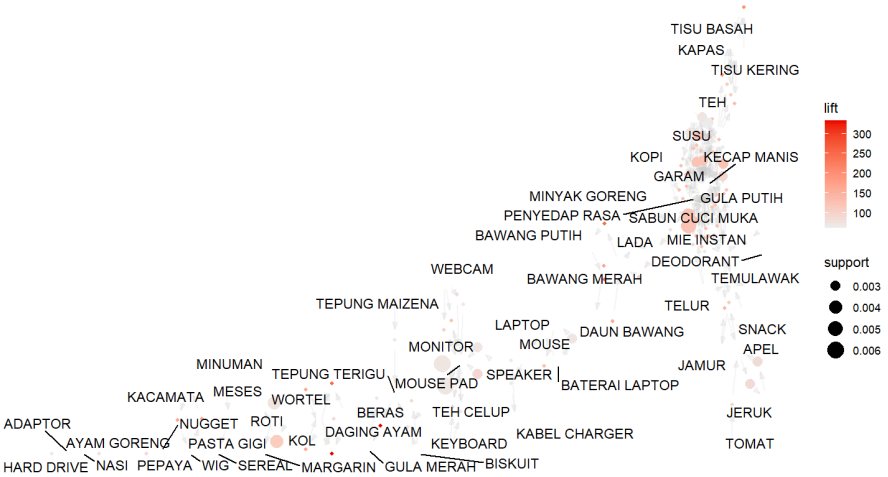
```
> summary(model20)
set of 1470 rules

rule length distribution (lhs + rhs):sizes
  2   3   4   5   6
133 636 538 145  18

   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   2.00    3.00    3.00    3.51    4.00    6.00

summary of quality measures:
    support           confidence        coverage             lift            count
 Min.   :0.002008   Min.   :0.4000   Min.   :0.002008   Min.   :  2.344   Min.   : 2.000
 1st Qu.:0.002008   1st Qu.:0.5000   1st Qu.:0.002008   1st Qu.:  5.627   1st Qu.: 2.000
 Median :0.002008   Median :0.6667   Median :0.003012   Median : 15.091   Median : 2.000
 Mean   :0.002416   Mean   :0.7303   Mean   :0.003768   Mean   : 24.730   Mean   : 2.407
 3rd Qu.:0.002008   3rd Qu.:1.0000   3rd Qu.:0.004016   3rd Qu.: 31.125   3rd Qu.: 2.000
 Max.   :0.019076   Max.   :1.0000   Max.   :0.041165   Max.   :332.000   Max.   :19.000

mining info:
              data ntransactions support confidence
 transaction_matrix           996   0.002        0.4
                                                                                                call
 apriori(data = transaction_matrix, parameter = list(minlen = 2, support = 0.002, confidence = 0.4))
```

Gambar 5.193 Output dari Pembuatan Model 1 dengan Algoritma Apriori [3]

Menampilkan plot graph.

```
> plot(sort(model20,by="lift"),method="graph",control=list(type="items"))
Warning: Unknown control parameters: type
Available control parameters (with default values):
layout   =  stress
circular         =  FALSE
ggraphdots       =  NULL
edges    =  <environment>
nodes    =  <environment>
nodetext         =  <environment>
colors   =  c("#EE0000FF", "#EEEEEEFF")
engine   =  ggplot2
max      =  100
verbose  =  FALSE
Warning messages:
1: Too many rules supplied. Only plotting the best 100 using 'lift' (change control parameter max if needed).
2: ggrepel: 57 unlabeled data points (too many overlaps). Consider increasing max.overlaps
>
```

Gambar 5.194 Output dari Pembuatan Graph [1]

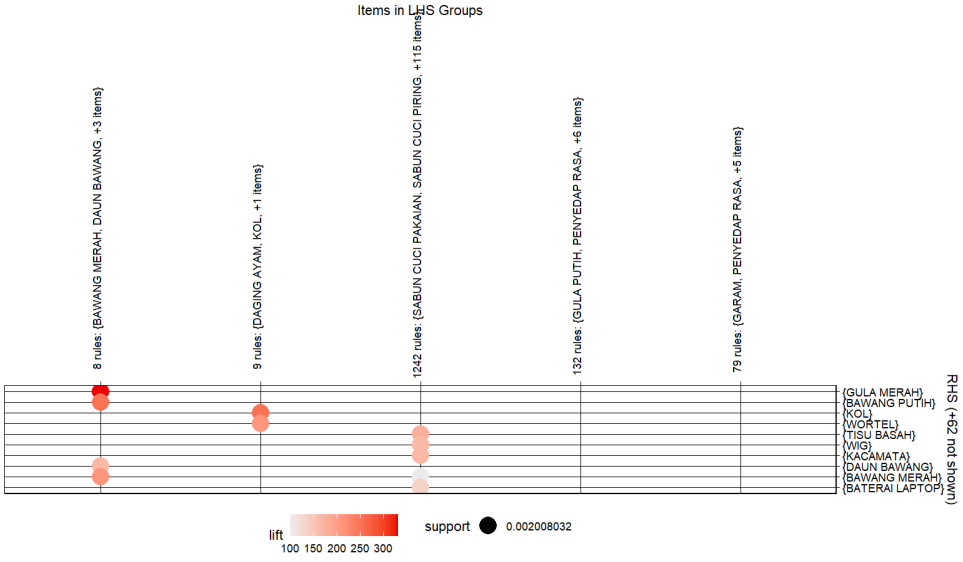


Gambar 5.195 Output dari Pembuatan Graph [2]

Menampilkan plot dengan 5 rules.

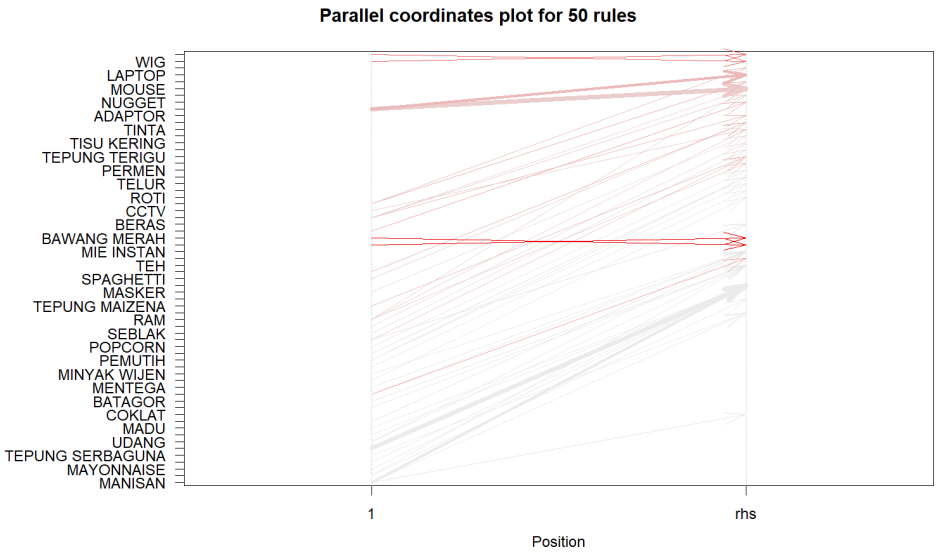
```
> plot(model20, method = "grouped", control = list(k = 5))
Warning messages:
1: ggrepel: 54 unlabeled data points (too many overlaps). Consider increasing max.overlaps
2: ggrepel: 54 unlabeled data points (too many overlaps). Consider increasing max.overlaps
```

Gambar 5.196 Output dari Pembuatan Plot 5 rules[1]



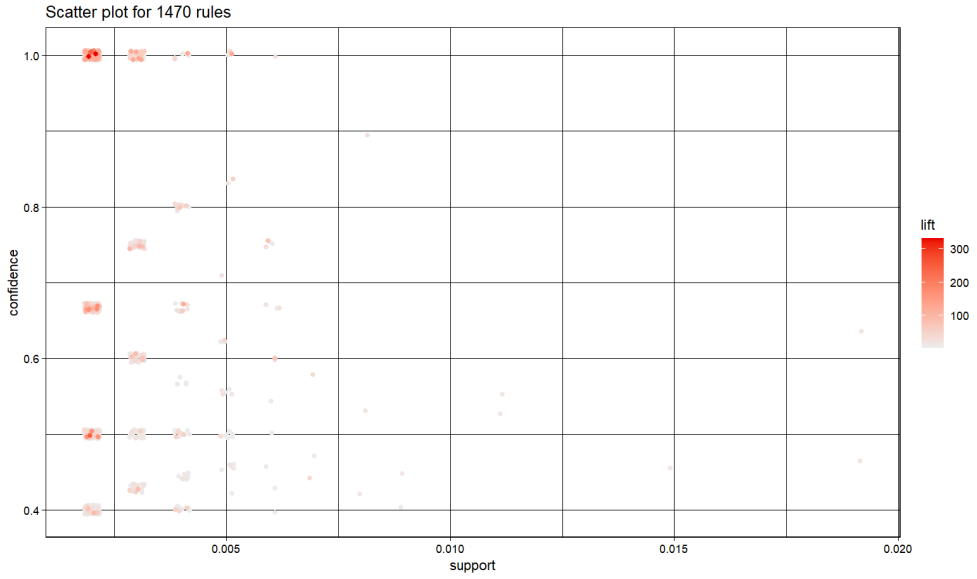
Gambar 5.197 Output dari Pembuatan Plot 5 rules[2]

Menampilkan plot koordinat paralel 50 aturan pertama.



Gambar 5.198 Output dari Pembuatan Plot Koordinat Paralel

Menampilkan scatter plot



Gambar 5.199 Output dari Pembuatan Scatter Plot

Menampilkan hasil prediksi.

```
> inputTest <- c("KEJU")
>
> # Filter rules based on lhs present in inputTest
> subset_rules <- subset(model20, subset = lhs %in% inputTest)
>
> # Filter rekomendasi yang tidak ada di dalam inputTest
> rekomendasi <- unique(labels(rhs(subset_rules)))
> rekomendasi <- gsub("[{}]", "", rekomendasi)
> rekomendasi <- setdiff(rekomendasi, inputTest)
>
> # Tampilkan hasil rekomendasi final
> print(rekomendasi)
[1] "MIE INSTAN" "SNACK"      "ROTI"       "SUSU"
```

Gambar 5.200 Hasil Prediksi

b. Data Testing

Berdasarkan data fitting yang telah dilakukan di atas, kami menyimpulkan bahwa model yang baik untuk memprediksi adalah model yang memiliki rulesnya banyak. Maka dari itu, pada data testing ini kami menggunakan model yang menghasilkan rulesnya banyak.

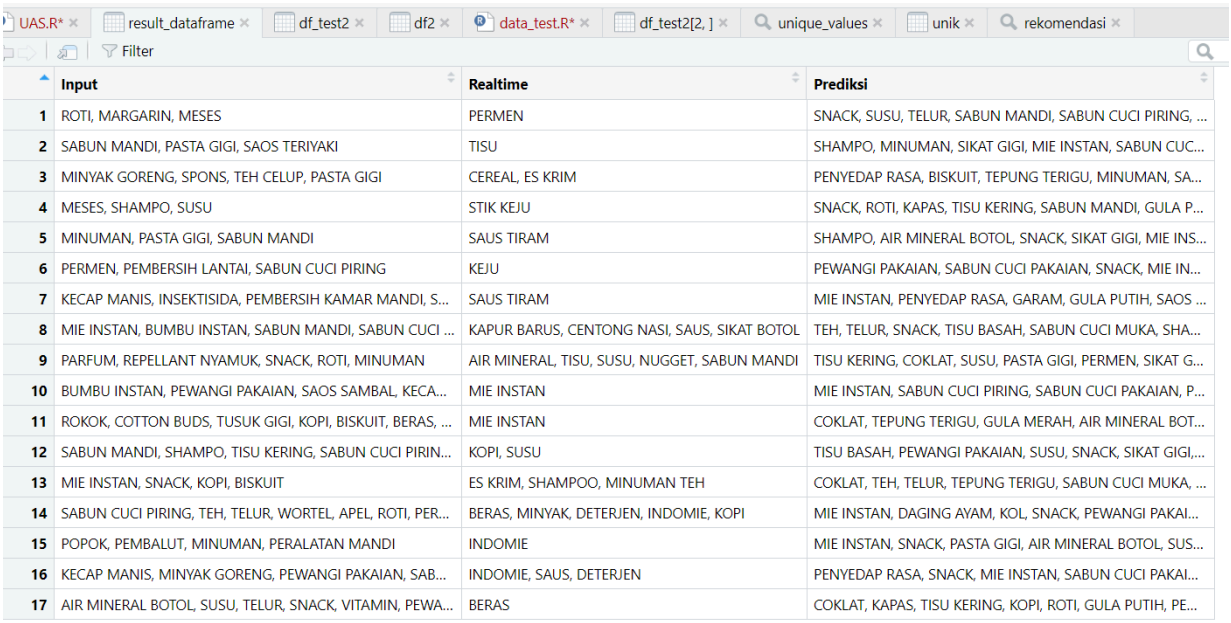
```
#Buat fungsi untuk memprediksi data frame test

generate_recommendations <- function(inputs, rules) {

  # Inisialisasi data frame kosong

   result_df <- data.frame(Input = character(), Rekomendasi =
character(), stringsAsFactors = FALSE)



  # Loop melalui setiap input

  for (input in inputs) {

    # Filter rules based on lhs present in input

    subset_rules <- subset(rules, subset = lhs %in% input)



    # Filter rekomendasi yang tidak ada di dalam input

    rekomendasi <- unique(labels(rhs(subset_rules)))
```

```
    rekomendasi <- gsub("[{}]", "", rekomendasi)

    rekomendasi <- setdiff(rekomendasi, input)



    # Tambahkan baris ke data frame hasil

          result_df  <-  rbind(result_df,  data.frame(Input  =
paste(input, collapse = ", "),

                                                      Prediksi =
paste(rekomendasi, collapse = ", "),

                                                  stringsAsFactors
= FALSE))

  }



  return(result_df)

}




# Contoh penggunaan dengan beberapa input

inputs <-  list(

  inputTest1,

  inputTest2,

  inputTest3,

  inputTest4,

  inputTest5,

  inputTest6,

  inputTest7,

  inputTest8,
```

```
  inputTest9,

  inputTest10,

  inputTest11,

  inputTest12,

  inputTest13,

  inputTest14,

  inputTest15,

  inputTest16,

  inputTest17

)
```

1.) Percobaan Pertama

```
# Gunakan model yang ingin diprediksi

model3   <-   apriori(transaction_matrix,   parameter   =
list(minlen=2,support = 0.002, confidence = 0.87))

rules <- model3

result_dataframe    <-    generate_recommendations(inputs,
rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe                                          <-
result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```



UAS.R* | result_dataframe | df_test2 | df2 | data_test.R* | df_test2[2,] | unique_values | unik | rekomendasi

Filter

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SABUN CUCI PIRING, ...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SIKAT GIGI, MIE INSTAN, SABUN CUC...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SA...
4	MESES, SHAMPO, SUSU	STIK KEJU	SNACK, ROTI, KAPAS, TISU KERING, SABUN MANDI, GULA P...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, AIR MINERAL BOTOL, SNACK, SIKAT GIGI, MIE INS...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE IN...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	MIE INSTAN, PENYEDAP RASA, GARAM, GULA PUTIH, SAOS ...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHA...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, PASTA GIGI, PERMEN, SIKAT G...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, P...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, AIR MINERAL BOT...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI,...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, ...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, DAGING AYAM, KOL, SNACK, PEWANGI PAKAI...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUS...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAI...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, ROTI, GULA PUTIH, PE...

Gambar 5.201 Hasil Prediksi

	INPUT	REAL ITEM	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SABUN CUCI PIRING, SOSIS, MINUMAN, SHAMPO, SABUN CUCI PAKAIAN, MIE INSTAN, TEH, KOPI	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SUSU, ROTI	0/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SABUN MANDI, TELUR, SIKAT GIGI, SABUN CUCI PAKAIAN, MIE INSTAN, KECAP MANIS, SABUN CUCI PIRING, KOPI, SHAMPO, BERAS	0/2
4	MESES, SHAMPO, SUSU	STIK KEJU	SNACK, ROTI, KAPAS, TISU KERING, SABUN MANDI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, TISU BASAH, GARAM, PEWANGI PAKAIAN, PASTA GIGI, TELUR, SABUN CUCI PAKAIAN, SAOS SAMBAL, MINUMAN, KOPI	1/1

5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, AIR MINERAL BOTOL, SNACK, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SUSU, ROTI	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE INSTAN, ROTI, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, BERAS, SUSU, TEH	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	MIE INSTAN, PENYEDAP RASA, GARAM, GULA PUTIH, SAOS SAMBAL, SNACK, SUSU, PEWANGI PAKAIAN	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHAMPO, BISKUIT, SABUN CUCI PIRING, APEL, MINUMAN, SUSU, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, SAOS SAMBAL, AIR MINERAL BOTOL, KOPI, KAPAS, MINYAK GORENG, BERAS, ROTI, ES KRIM	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, PASTA GIGI, PERMEN, SIKAT GIGI, MIE INSTAN, SABUN MANDI, AIR MINERAL BOTOL, TELUR, SABUN CUCI PIRING, SHAMPO, SOSIS, KOPI, SABUN CUCI PAKAIAN, TEH, ES KRIM	4/5
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PENYEDAP RASA, GARAM, GULA PUTIH, SHAMPO, SIKAT GIGI, SABUN MANDI, TELUR, SNACK, SUSU, PASTA GIGI, MINYAK GORENG	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, AIR MINERAL BOTOL, MIE INSTAN, SUSU, PERMEN, ROTI, GARAM, GULA PUTIH, SABUN CUCI PAKAIAN, SABUN MANDI, TELUR, SHAMPO, PENYEDAP RASA, SABUN CUCI PIRING, SOSIS, SIKAT GIGI, SAOS SAMBAL, KECAP MANIS, MINUMAN, MINYAK GORENG,	1/1

			ES KRIM, TEH	
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI, MIE INSTAN, AIR MINERAL BOTOL, TELUR, KOPI, KAPAS, SOSIS, PASTA GIGI, MINUMAN, MINYAK GORENG, BERAS, TEH	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, AIR MINERAL BOTOL, SUSU, APEL, PERMEN, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SABUN CUCI PAKAIAN, SABUN MANDI, SHAMPO, PEWANGI PAKAIAN, SIKAT GIGI, SABUN CUCI PIRING, SOSIS, SAOS SAMBAL, MINYAK GORENG, MINUMAN, BERAS, PASTA GIGI, ES KRIM	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, DAGING AYAM, KOL, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, GULA PUTIH, PENYEDAP RASA, GARAM, KECAP MANIS, SUSU, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, MINUMAN, BERAS, ES KRIM, PERMEN	5/5
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUSU, ROTI	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAIAN, GARAM, GULA PUTIH, ROTI, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, SUSU, KOPI, SOSIS, PASTA GIGI, BERAS, TEH	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, ROTI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, PERMEN, MIE INSTAN, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, TISU BASAH, GARAM, SOSIS, PASTA GIGI, MINYAK GORENG, MINUMAN, BERAS, TEH, ES KRIM	1/1

2.) Percobaan Kedua

```
model16 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.9))
#Percobaan = Rules 555

rules <- model16

result_dataframe <- generate_recommendations(inputs, rules)

# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

Filter

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SABUN CUCI PIRING, ...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SIKAT GIGI, MIE INSTAN, SABUN CUC...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SA...
4	MESES, SHAMPO, SUSU	STIK KEJU	SNACK, ROTI, KAPAS, TISU KERING, SABUN MANDI, GULA P...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, AIR MINERAL BOTOL, SNACK, SIKAT GIGI, MIE INS...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE IN...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	MIE INSTAN, PENYEDAP RASA, GARAM, GULA PUTIH, SAOS ...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHA...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, PASTA GIGI, PERMEN, SIKAT G...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, P...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, AIR MINERAL BOT...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI,...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, ...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, DAGING AYAM, KOL, SNACK, PEWANGI PAKAI...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUS...

owing 1 to 15 of 17 entries, 3 total columns

Gambar 5.202 Hasil Prediksi

	INPUT	REAL ITEM	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SABUN CUCI PIRING, SOSIS, MINUMAN, SHAMPO, SABUN CUCI PAKAIAN, MIE INSTAN, TEH, KOPI	0/1

2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SUSU, ROTI	0/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SABUN MANDI, TELUR, SIKAT GIGI, SABUN CUCI PAKAIAN, MIE INSTAN, KECAP MANIS, SABUN CUCI PIRING, KOPI, SHAMPO, BERAS	0/2
4	MESES, SHAMPO, SUSU	STIK KEJU	SNACK, ROTI, KAPAS, TISU KERING, SABUN MANDI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, TISU BASAH, GARAM, PEWANGI PAKAIAN, PASTA GIGI, TELUR, SABUN CUCI PAKAIAN, SAOS SAMBAL, MINUMAN, KOPI	1/1
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, AIR MINERAL BOTOL, SNACK, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SUSU, ROTI	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE INSTAN, ROTI, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, BERAS, SUSU, TEH	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	MIE INSTAN, PENYEDAP RASA, GARAM, GULA PUTIH, SAOS SAMBAL, SNACK, SUSU, PEWANGI PAKAIAN	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHAMPO, BISKUIT, SABUN CUCI PIRING, APEL, MINUMAN, SUSU, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, SAOS SAMBAL, AIR MINERAL BOTOL, KOPI, KAPAS, MINYAK GORENG, BERAS, ROTI, ES KRIM	1/4

	GIGI			
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, PASTA GIGI, PERMEN, SIKAT GIGI, MIE INSTAN, SABUN MANDI, AIR MINERAL BOTOL, TELUR, SABUN CUCI PIRING, SHAMPO, SOSIS, KOPI, SABUN CUCI PAKAIAN, TEH, ES KRIM	4/5
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PENYEDAP RASA, GARAM, GULA PUTIH, SHAMPO, SIKAT GIGI, SABUN MANDI, TELUR, SNACK, SUSU, PASTA GIGI, MINYAK GORENG	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, AIR MINERAL BOTOL, MIE INSTAN, SUSU, PERMEN, ROTI, GARAM, GULA PUTIH, SABUN CUCI PAKAIAN, SABUN MANDI, TELUR, SHAMPO, PENYEDAP RASA, SABUN CUCI PIRING, SOSIS, SIKAT GIGI, SAOS SAMBAL, KECAP MANIS, MINUMAN, MINYAK GORENG, ES KRIM, TEH	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI, MIE INSTAN, AIR MINERAL BOTOL, TELUR, KOPI, KAPAS, SOSIS, PASTA GIGI, MINUMAN, MINYAK GORENG, BERAS, TEH	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, AIR MINERAL BOTOL, SUSU, APEL, PERMEN, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SABUN CUCI PAKAIAN, SABUN MANDI, SHAMPO, PEWANGI PAKAIAN, SIKAT GIGI, SABUN CUCI PIRING, SOSIS, SAOS SAMBAL, MINYAK GORENG, MINUMAN, BERAS, PASTA GIGI, ES KRIM	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, DAGING AYAM, KOL, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, GULA PUTIH, PENYEDAP RASA, GARAM, KECAP MANIS, SUSU, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, MINUMAN, BERAS, ES KRIM, PERMEN	5/5

15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUSU, ROTI	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAIAN, GARAM, GULA PUTIH, ROTI, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, SUSU, KOPI, SOSIS, PASTA GIGI, BERAS, TEH	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, ROTI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, PERMEN, MIE INSTAN, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, TISU BASAH, GARAM, SOSIS, PASTA GIGI, MINYAK GORENG, MINUMAN, BERAS, TEH, ES KRIM	1/1

3.) Percobaan Ketiga

```
model19 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.8))
#Percobaan = Rules 571

rules <- model19

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]
```

```
View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SABUN CUCI PIRING, ...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SIKAT GIGI, MIE INSTAN, SABUN CUC...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SA...
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, SNACK, MARGARIN, KAPAS, TISU KERING, SABUN MA...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, AIR MINERAL BOTOL, SNACK, SIKAT GIGI, MIE INS...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE IN...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	MIE INSTAN, PENYEDAP RASA, GARAM, GULA PUTIH, SAOS ...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHA...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, MARGARIN, SUSU, PASTA GIGI, PER...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, P...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, AIR MINERAL BOT...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, TISU BASAH, PEWANGI PAKAIAN, SUSU, SNAC...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, ...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, MARGARIN, DAGING AYAM, KOL, SNACK, PEW...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUS...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAI...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, ROTI, GULA PUTIH, PE...

Gambar 5.203 Hasil Prediksi

	INPUT	REAL ITEM	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SABUN CUCI PIRING, SOSIS, MINUMAN, SHAMPO, SABUN CUCI PAKAIAN, MIE INSTAN, TEH, KOPI	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SUSU, ROTI	0/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SABUN MANDI, TELUR, MIE INSTAN, SIKAT GIGI, SHAMPO, SABUN CUCI PAKAIAN, KECAP MANIS, SABUN CUCI PIRING, KOPI, BERAS	0/2
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, SNACK, MARGARIN, KAPAS, TISU KERING, SABUN MANDI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, TISU BASAH, GARAM, PEWANGI PAKAIAN, PASTA GIGI, TELUR, SABUN CUCI PAKAIAN, SAOS SAMBAL, MINUMAN, KOPI	1/1

5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, AIR MINERAL BOTOL, SNACK, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SUSU, ROTI	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE INSTAN, ROTI, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, BERAS, SUSU, TEH	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	MIE INSTAN, PENYEDAP RASA, GARAM, GULA PUTIH, SAOS SAMBAL, SNACK, SUSU, PEWANGI PAKAIAN	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHAMPO, BISKUIT, SABUN CUCI PIRING, APEL, MINUMAN, SUSU, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, SAOS SAMBAL, AIR MINERAL BOTOL, KOPI, KAPAS, MINYAK GORENG, BERAS, ROTI, ES KRIM	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, MARGARIN, SUSU, PASTA GIGI, PERMEN, SIKAT GIGI, MIE INSTAN, SABUN MANDI, AIR MINERAL BOTOL, TELUR, SABUN CUCI PIRING, SHAMPO, SOSIS, KOPI, SABUN CUCI PAKAIAN, TEH, ES KRIM	4/5
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PENYEDAP RASA, GARAM, GULA PUTIH, SHAMPO, SIKAT GIGI, SABUN MANDI, TELUR, SNACK, SUSU, PASTA GIGI, MINYAK GORENG	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS,	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, AIR MINERAL BOTOL, MIE INSTAN, SUSU, PERMEN, ROTI, GARAM, GULA PUTIH, SABUN CUCI PAKAIAN, SABUN MANDI, TELUR, SHAMPO, PENYEDAP RASA, SABUN CUCI PIRING, SOSIS, SIKAT GIGI, SAOS SAMBAL, KECAP MANIS, MINUMAN, MINYAK GORENG, ES	1/1

	SNACK		KRIM, TEH	
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	MARGARIN, TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI, MIE INSTAN, AIR MINERAL BOTOL, TELUR, KOPI, KAPAS, SOSIS, PASTA GIGI, MINUMAN, MINYAK GORENG, BERAS, TEH	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, AIR MINERAL BOTOL, SUSU, APEL, PERMEN, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, SABUN CUCI PAKAIAN, SABUN MANDI, SHAMPO, PEWANGI PAKAIAN, SABUN CUCI PIRING, SOSIS, SAOS SAMBAL, MINYAK GORENG, MINUMAN, BERAS, PASTA GIGI, ES KRIM	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, MARGARIN, DAGING AYAM, KOL, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, GULA PUTIH, PENYEDAP RASA, GARAM, KECAP MANIS, SUSU, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, SAOS SAMBAL, MINUMAN, BERAS, ES KRIM, PERMEN	5/5
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUSU, ROTI	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAIAN, GARAM, GULA PUTIH, ROTI, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, SUSU, KOPI, SOSIS, PASTA GIGI, BERAS, TEH	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, ROTI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, PERMEN, MIE INSTAN, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, TISU BASAH, GARAM, SOSIS, PASTA GIGI, MINYAK GORENG, MINUMAN, BERAS, TEH, ES KRIM	1/1

4.) Percobaan Keempat

```
model12 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.6))
#Percobaan = Rules 999

rules <- model12

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, PASTA GIGI, SABUN MANDI, SHAMPO...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SEREAL, SUSU, SIKAT GIGI, SABUN C...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SE...
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, SNACK, KAPAS, TISU BAS...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SEREAL, MIE INSTAN, SUSU, SIKAT GIGI, SABUN C...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, KOPI, SNACK, ...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	MIE INSTAN, GULA PUTIH, GARAM, PENYEDAP RASA, SUSU,...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, KECAP MANIS, TISU BASAH, SABUN CU...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, MARGARIN, MESES, TELUR, PA...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, G...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, SUSU, TELUR, TEH...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, MESES, TISU BASAH, PEWANGI PAKAIAN, SUSU...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, SUSU, TELUR, TEPUNG TERIGU, TEH CELUP, K...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, MARGARIN, MESES, DAGING AYAM, KOL, SNA...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, SUSU, PASTA GIGI, SEREAL, COKLAT, S...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	MIE INSTAN, PENYEDAP RASA, SNACK, SABUN CUCI PAKAI...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	COKLAT, MIE INSTAN, KAPAS, TISU BASAH, TISU KERING, K...

Gambar 5.204 Hasil Prediksi

	INPUT	REALTIME	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, PASTA GIGI, SABUN MANDI, SHAMPO, SABUN CUCI PAKAIAN, SABUN CUCI PIRING, KOPI, TEH, MIE INSTAN, SOSIS, MINUMAN, TISU KERING	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SEREAL, SUSU, SIKAT GIGI, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, MIE INSTAN, SNACK, PARFUM, ROTI, TISU KERING	1/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SEREAL, SABUN MANDI, SUSU, SIKAT GIGI, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, TELUR, MIE INSTAN, SAOS SAMBAL, KECAP MANIS, SABUN CUCI PIRING, KOPI, SHAMPO, BERAS	1/2
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, SNACK, KAPAS, TISU BASAH, TISU KERING, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, TEH, MIE INSTAN, KOPI, SIKAT GIGI, PASTA GIGI, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, WAFER, PARFUM, TELUR, SAOS SAMBAL, MINUMAN, PERMEN	1/1
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SEREAL, MIE INSTAN, SUSU, SIKAT GIGI, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, COKLAT, AIR MINERAL BOTOL, TISU KERING, SNACK, PARFUM, ROTI, TEH	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, KOPI, SNACK, MIE INSTAN, ROTI, SHAMPO, SIKAT GIGI, SABUN MANDI, SUSU, SOSIS, MINYAK GORENG, BERAS, TELUR, TEH, AIR MINERAL BOTOL	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	MIE INSTAN, GULA PUTIH, GARAM, PENYEDAP RASA, SUSU, SAOS SAMBAL, PEWANGI PAKAIAN, TELUR, SNACK, TEH, KOPI, MINYAK GORENG	0/1

8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, KECAP MANIS, TISU BASAH, SABUN CUCI MUKA, DEODORANT, SHAMPO, BISKUIT, SABUN CUCI PIRING, APEL, JAMUR, MINUMAN, SEREAL, SUSU, GULA PUTIH, GARAM, PENYEDAP RASA, BERAS, SAOS SAMBAL, SIKAT GIGI, PARFUM, PERMEN, MINYAK GORENG, AIR MINERAL BOTOL, KOPI, ROTI, TEMULAWAK, KAPAS, ES KRIM	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, MARGARIN, MESES, TELUR, PASTA GIGI, SEREAL, PERMEN, MIE INSTAN, SIKAT GIGI, SABUN MANDI, SABUN CUCI PIRING, SHAMPO, SABUN CUCI PAKAIAN, AIR MINERAL BOTOL, KOPI, TEH, TEMULAWAK, WAFER, SOSIS, ES KRIM, BISKUIT	4/5
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, GULA PUTIH, GARAM, PENYEDAP RASA, SUSU, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, PASTA GIGI, TELUR, MINYAK GORENG, SNACK, TEH, KOPI	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, SUSU, TELUR, TEH CELUP, AIR MINERAL BOTOL, MIE INSTAN, PERMEN, ROTI, GARAM, PENYEDAP RASA, GULA PUTIH, SABUN CUCI PIRING, SHAMPO, SABUN CUCI PAKAIAN, SABUN MANDI, KECAP MANIS, TEH, TEMULAWAK, WAFER, SOSIS, SIKAT GIGI, SAOS SAMBAL, MINUMAN, MINYAK GORENG, ES KRIM	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	MARGARIN, MESES, TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI, MIE INSTAN, PASTA GIGI, AIR MINERAL BOTOL, KOPI, TELUR, SAOS SAMBAL, MINYAK GORENG, TEH, KAPAS, PARFUM, SOSIS, MINUMAN, BERAS	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, SUSU, TELUR, TEPUNG TERIGU, TEH CELUP, KECAP MANIS, SABUN CUCI MUKA, DEODORANT, AIR MINERAL BOTOL, APEL, JAMUR, PERMEN, ROTI, GARAM, GULA PUTIH, PENYEDAP RASA, BERAS, PEWANGI PAKAIAN, SIKAT GIGI, PARFUM, SABUN CUCI PIRING, SHAMPO, SABUN CUCI PAKAIAN, SABUN MANDI, SAOS SAMBAL, PASTA GIGI, TEMULAWAK, WAFER, BUMBU INSTAN, SOSIS, MINYAK GORENG, MINUMAN, ES KRIM	3/3

14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, MARGARIN, MESES, DAGING AYAM, KOL, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, JAMUR, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, KOPI, SUSU, SHAMPO, SIKAT GIGI, SABUN MANDI, MINYAK GORENG, PASTA GIGI, TEMULAWAK, SOSIS, SAOS SAMBAL, MINUMAN, BERAS, TISU KERING, BISKUIT, ES KRIM, PERMEN, AIR MINERAL BOTOL	5/5
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, SUSU, PASTA GIGI, SEREAL, COKLAT, SABUN MANDI, AIR MINERAL BOTOL, TISU KERING, ROTI, TEH	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	MIE INSTAN, PENYEDAP RASA, SNACK, SABUN CUCI PAKAIAN, GULA PUTIH, GARAM, SUSU, KOPI, SAOS SAMBAL, BUMBU INSTAN, ROTI, SHAMPO, SIKAT GIGI, SABUN MANDI, PASTA GIGI, TEMULAWAK, TEH, SOSIS, BERAS	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, MIE INSTAN, KAPAS, TISU BASAH, TISU KERING, KOPI, PERMEN, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, TEH, SAOS SAMBAL, BUMBU INSTAN, SHAMPO, SIKAT GIGI, SABUN MANDI, PASTA GIGI, MINYAK GORENG, TEMULAWAK, WAFER, SOSIS, MINUMAN, BERAS, ES KRIM, BISKUIT	1/1

Pada percobaan keempat ini menggunakan model15 yang menghasilkan 10 dari 17 yang terprediksi secara akurat.

5.) Percobaan Kelima

```
model13 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.5))
#Percobaan = Rules 1278

rules <- model13

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil
```

```
result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe                                          <-
result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SABUN CUCI PIRING, SOSIS, SUSU, TELUR, BERAS, P...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SEREAL, SUSU, GULA PUTIH, SIKAT GI...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SE...
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, SNACK, KAPAS, TISU BAS...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SEREAL, MIE INSTAN, SUSU, GULA PUTIH, SIKAT ...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, KOPI, SNACK, ...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	MIE INSTAN, GULA PUTIH, GARAM, PENYEDAP RASA, TELUR...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, KECAP MANIS, KAPAS, TISU BASAH, SU...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, MARGARIN, MESES, TELUR, M...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	PENYEDAP RASA, MIE INSTAN, SABUN CUCI PAKAIAN, SAB...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, SUSU, TELUR, MIE ...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, MESES, KAPAS, TISU BASAH, SUSU, PEWANGI P...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, SUSU, TELUR, TEPUNG TERIGU, TEH CELUP, K...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, KOL, DAGING AYAM, MINYAK GORENG, MARG...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SUSU, SNACK, PASTA GIGI, SEREAL, MINUMAN...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	MIE INSTAN, SABUN CUCI PAKAIAN, PENYEDAP RASA, SNA...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	COKLAT, MIE INSTAN, KAPAS, TISU BASAH, TISU KERING, K...

Gambar 5.205 Hasil Prediksi

	INPUT	REALTIME	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SABUN CUCI PIRING, SOSIS, SUSU, TELUR, BERAS, PASTA GIGI, SHAMPO, SABUN MANDI, MINYAK GORENG, SABUN CUCI PAKAIAN, KOPI, TEH, MIE INSTAN, TISU KERING, MINUMAN	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SEREAL, SUSU, GULA PUTIH, SIKAT GIGI, MIE INSTAN, SNACK, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, TISU KERING, ROTI, PARFUM, KOPI	1/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SEREAL, SABUN MANDI, SUSU, GULA PUTIH, SIKAT GIGI, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, MIE INSTAN, TELUR, SAOS SAMBAL, KECAP MANIS, SHAMPO, SABUN CUCI PIRING, KOPI, SNACK, BERAS	1/2

4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, SNACK, KAPAS, TISU BASAH, TISU KERING, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, TEH, MIE INSTAN, KOPI, SIKAT GIGI, COKLAT, PASTA GIGI, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, TELUR, WAFER, PARFUM, SAOS SAMBAL, MINUMAN, PERMEN	1/1
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SEREAL, MIE INSTAN, SUSU, GULA PUTIH, SIKAT GIGI, SNACK, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, COKLAT, AIR MINERAL BOTOL, TISU KERING, ROTI, TEH, PARFUM, KOPI	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, KOPI, SNACK, MIE INSTAN, ROTI, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, MINYAK GORENG, TELUR, BERAS, SUSU, TEH, BISKUIT, SEREAL, WAFER, AIR MINERAL BOTOL	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	MIE INSTAN, GULA PUTIH, GARAM, PENYEDAP RASA, TELUR, TEH, SUSU, SAOS SAMBAL, PEWANGI PAKAIAN, SNACK, MINYAK GORENG, KOPI	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, KECAP MANIS, KAPAS, TISU BASAH, SUSU, SABUN CUCI MUKA, DEODORANT, SHAMPO, BISKUIT, SABUN CUCI PIRING, APEL, JAMUR, MINUMAN, SEREAL, GULA PUTIH, GARAM, PENYEDAP RASA, BERAS, SAOS SAMBAL, SIKAT GIGI, PARFUM, PERMEN, MINYAK GORENG, AIR MINERAL BOTOL, KOPI, COKLAT, ROTI, TEMULAWAK, ES KRIM	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, MARGARIN, MESES, TELUR, MIE INSTAN, PASTA GIGI, SEREAL, PERMEN, KOPI, TEH, BISKUIT, MINUMAN KESEHATAN, SHAMPO, SIKAT GIGI, SABUN MANDI, SABUN CUCI PIRING, SOSIS, SABUN CUCI PAKAIAN, AIR MINERAL BOTOL, BERAS, MINYAK GORENG, TEMULAWAK, WAFER, ES KRIM	4/5

10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	PENYEDAP RASA, MIE INSTAN, SABUN CUCI PAKAIAN, SABUN CUCI PIRING, GULA PUTIH, GARAM, TELUR, TEH, SUSU, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, PASTA GIGI, MINYAK GORENG, SNACK, KOPI	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, SUSU, TELUR, MIE INSTAN, TEH CELUP, AIR MINERAL BOTOL, PERMEN, TEH, MINUMAN KESEHATAN, MINUMAN BUAH, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, MINUMAN BERKARBONASI, WAFER, SABUN MANDI, SABUN CUCI PIRING, SHAMPO, SABUN CUCI PAKAIAN, SIKAT GIGI, SAOS SAMBAL, KECAP MANIS, MINUMAN, MINYAK GORENG, TEMULAWAK, SEREAL, SOSIS, ES KRIM	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	MARGARIN, MESES, KAPAS, TISU BASAH, SUSU, PEWANGI PAKAIAN, PASTA GIGI, SNACK, SIKAT GIGI, MIE INSTAN, SOSIS, AIR MINERAL BOTOL, MINUMAN, MINYAK GORENG, TELUR, BERAS, KOPI, SAOS SAMBAL, TEH, COKLAT, PARFUM	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, SUSU, TELUR, TEPUNG TERIGU, TEH CELUP, KECAP MANIS, SABUN CUCI MUKA, DEODORANT, AIR MINERAL BOTOL, APEL, JAMUR, PERMEN, MINUMAN KESEHATAN, MINUMAN BUAH, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, MINUMAN BERKARBONASI, WAFER, BERAS, PEWANGI PAKAIAN, SAOS SAMBAL, SIKAT GIGI, PARFUM, SABUN MANDI, SABUN CUCI PIRING, SHAMPO, PASTA GIGI, SABUN CUCI PAKAIAN, MINUMAN, MINYAK GORENG, TEMULAWAK, SEREAL, BUMBU INSTAN, SOSIS, ES KRIM	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, KOL, DAGING AYAM, MINYAK GORENG, MARGARIN, MESES, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, JAMUR, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, KOPI, SUSU, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, BERAS, PASTA GIGI, TISU KERING, TEMULAWAK, MINUMAN, BISKUIT, ES KRIM, PERMEN, AIR MINERAL BOTOL	5/5
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SUSU, SNACK, PASTA GIGI, SEREAL, MINUMAN KESEHATAN, COKLAT, SABUN MANDI, AIR MINERAL BOTOL, TISU KERING, ROTI, TEH	1/1

16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	MIE INSTAN, SABUN CUCI PAKAIAN, PENYEDAP RASA, SNACK, GULA PUTIH, GARAM, TEH, SUSU, KOPI, SAOS SAMBAL, BUMBU INSTAN, ROTI, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, PASTA GIGI, BERAS, TEMULAWAK	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, MIE INSTAN, KAPAS, TISU BASAH, TISU KERING, KOPI, PERMEN, TEH, BISKUIT, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, MINUMAN KESEHATAN, SAOS SAMBAL, BUMBU INSTAN, SABUN MANDI, SOSIS, SHAMPO, SIKAT GIGI, PASTA GIGI, MINYAK GORENG, MINUMAN, BERAS, TEMULAWAK, SEREAL, WAFER, ES KRIM	1/1

Pada percobaan kelima ini menggunakan model13 yang menghasilkan 10 dari 17 yang terprediksi secara akurat.

6.) Percobaan Keenam

```
model20 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.4))
#Percobaan = Rules 1477

rules <- model20

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SABUN CUCI PIRING, SOSIS, SUSU, TELUR, BERAS, P...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SEREAL, SUSU, GULA PUTIH, SIKAT GI...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	SABUN MANDI, PENYEDAP RASA, LADA, BISKUIT, TEPUNG T...
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, SNACK, KAPAS, TISU BAS...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SEREAL, MIE INSTAN, SUSU, GULA PUTIH, SIKAT ...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, KOPI, SNACK, ...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	PENYEDAP RASA, MIE INSTAN, GULA PUTIH, GARAM, TELUR...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SHAMPO, TEH, TELUR, SNACK, KECAP MANIS, KAPAS, TISU ...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, MARGARIN, MESES, TELUR, M...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	PENYEDAP RASA, MIE INSTAN, SABUN CUCI PAKAIAN, SAB...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, SUSU, TELUR, MIE ...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, MESES, KAPAS, TISU BASAH, SUSU, PEWANGI P...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, SUSU, TELUR, TEPUNG TERIGU, TEH CELUP, K...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, KOL, JERUK, DAGING AYAM, MINYAK GORENG,...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SUSU, SNACK, PASTA GIGI, SEREAL, MINUMAN...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	MIE INSTAN, SABUN CUCI PAKAIAN, PENYEDAP RASA, LAD...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	COKLAT, MIE INSTAN, KAPAS, TISU BASAH, TISU KERING, K...

Gambar 5.206 Hasil Prediksi

	INPUT	REALTIME	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SABUN CUCI PIRING, SOSIS, SUSU, TELUR, BERAS, PASTA GIGI, SHAMPO, SABUN MANDI, MINYAK GORENG, SABUN CUCI PAKAIAN, KOPI, TEH, MIE INSTAN, TISU KERING, MINUMAN	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SEREAL, SUSU, GULA PUTIH, SIKAT GIGI, MIE INSTAN, SNACK, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, ROTI, TISU KERING, PARFUM, KOPI	1/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	SABUN MANDI, PENYEDAP RASA, LADA, BISKUIT, TEPUNG TERIGU, MINUMAN, SEREAL, SUSU, GULA PUTIH, SIKAT GIGI, SABUN CUCI PAKAIAN, PEWANGI PAKAIAN, MIE INSTAN, TELUR, SAOS SAMBAL, KECAP MANIS, BERAS, SHAMPO, SABUN CUCI PIRING, KOPI, SNACK, ROTI	1/2
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, SNACK, KAPAS, TISU BASAH, TISU KERING, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, TEH, MIE INSTAN, KOPI, PASTA GIGI, SIKAT GIGI, PARFUM, COKLAT, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, TELUR, SAOS SAMBAL, BISKUIT, WAFER, MINUMAN, PERMEN	1/1

5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SEREAL, MIE INSTAN, SUSU, GULA PUTIH, SIKAT GIGI, SNACK, SABUN CUCI PIRING, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, AIR MINERAL BOTOL, COKLAT, TISU KERING, ROTI, TEH, PARFUM, KOPI	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, KOPI, SNACK, MIE INSTAN, ROTI, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, MINYAK GORENG, TELUR, BERAS, SUSU, PASTA GIGI, TEH, BISKUIT, VITAMIN, SEREAL, WAFER, AIR MINERAL BOTOL	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	PENYEDAP RASA, MIE INSTAN, GULA PUTIH, GARAM, TELUR, TEH, SUSU, SAOS SAMBAL, PEWANGI PAKAIAN, MINYAK GORENG, SNACK, PERMEN, KOPI	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SHAMPO, TEH, TELUR, SNACK, KECAP MANIS, KAPAS, TISU BASAH, SUSU, SABUN CUCI MUKA, DEODORANT, BISKUIT, SABUN CUCI PIRING, APEL, JAMUR, MINUMAN, SEREAL, GULA PUTIH, GARAM, PENYEDAP RASA, BERAS, SAOS SAMBAL, SIKAT GIGI, PARFUM, PERMEN, MINYAK GORENG, AIR MINERAL BOTOL, KOPI, COKLAT, ROTI, TEMULAWAK, VITAMIN, ES KRIM	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, SUSU, MARGARIN, MESES, TELUR, MIE INSTAN, PASTA GIGI, SEREAL, PERMEN, KOPI, TEH, BISKUIT, MINUMAN KESEHATAN, SHAMPO, SIKAT GIGI, SABUN MANDI, SABUN CUCI PIRING, SOSIS, SABUN CUCI PAKAIAN, AIR MINERAL BOTOL, BERAS, MINYAK GORENG, TEMULAWAK, WAFER, ES KRIM	4/5
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	PENYEDAP RASA, MIE INSTAN, SABUN CUCI PAKAIAN, SABUN CUCI PIRING, GULA PUTIH, GARAM, TELUR, TEH, SUSU, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, PASTA GIGI, MINYAK GORENG, SNACK, PERMEN, VITAMIN, AIR MINERAL BOTOL, KOPI	1/1

11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, SUSU, TELUR, MIE INSTAN, TEH CELUP, AIR MINERAL BOTOL, LOTION, PERMEN, TEH, MINUMAN KESEHATAN, MINUMAN BUAH, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, MINUMAN BERKARBONASI, WAFER, SABUN MANDI, SABUN CUCI PIRING, SHAMPO, SIKAT GIGI, SABUN CUCI PAKAIAN, SAOS SAMBAL, KECAP MANIS, MINUMAN, MINYAK GORENG, TEMULAWAK, SEREAL, SOSIS, ES KRIM	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	MARGARIN, MESES, KAPAS, TISU BASAH, SUSU, PEWANGI PAKAIAN, PASTA GIGI, SNACK, SIKAT GIGI, MIE INSTAN, PARFUM, SOSIS, AIR MINERAL BOTOL, MINUMAN, MINYAK GORENG, TELUR, BERAS, KOPI, SAOS SAMBAL, BISKUIT, TEH, COKLAT, VITAMIN	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, SUSU, TELUR, TEPUNG TERIGU, TEH CELUP, KECAP MANIS, SABUN CUCI MUKA, DEODORANT, AIR MINERAL BOTOL, LOTION, APEL, JAMUR, PERMEN, MINUMAN KESEHATAN, MINUMAN BUAH, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, MINUMAN BERKARBONASI, WAFER, BERAS, PEWANGI PAKAIAN, BUMBU INSTAN, SAOS SAMBAL, SIKAT GIGI, PARFUM, SHAMPO, SABUN MANDI, SABUN CUCI PIRING, PASTA GIGI, SABUN CUCI PAKAIAN, MINYAK GORENG, MINUMAN, TEMULAWAK, SEREAL, SOSIS, ES KRIM	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, KOL, JERUK, DAGING AYAM, MINYAK GORENG, MARGARIN, MESES, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, JAMUR, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, KOPI, SUSU, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, BERAS, PASTA GIGI, TISU KERING, TEMULAWAK, VITAMIN, AIR MINERAL BOTOL, MINUMAN, COKLAT, BISKUIT, ES KRIM, PERMEN	5/5
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SUSU, SNACK, PASTA GIGI, SEREAL, MINUMAN KESEHATAN, AIR MINERAL BOTOL, COKLAT, SABUN MANDI, TISU KERING, ROTI, TEH	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN	INDOMIE, SAUS, DETERJEN	MIE INSTAN, SABUN CUCI PAKAIAN, PENYEDAP RASA, LADA, SNACK, GULA PUTIH, GARAM, TEH, SUSU, KOPI, SAOS SAMBAL, BUMBU INSTAN, ROTI, SOSIS, SHAMPO, SIKAT GIGI, SABUN MANDI,	3/3

	CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA		PASTA GIGI, PERMEN, BERAS, TEMULAWAK, VITAMIN, AIR MINERAL BOTOL	
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, MIE INSTAN, KAPAS, TISU BASAH, TISU KERING, KOPI, LOTION, PERMEN, TEH, BISKUIT, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, MINUMAN KESEHATAN, SAOS SAMBAL, BUMBU INSTAN, PASTA GIGI, SABUN MANDI, SOSIS, SHAMPO, SIKAT GIGI, MINYAK GORENG, MINUMAN, BERAS, TEMULAWAK, SEREAL, WAFER, ES KRIM	1/1

Pada percobaan keenam ini menggunakan model20 yang menghasilkan 10 dari 17 yang terprediksi secara akurat.

7.) Percobaan Ketujuh

```
model1 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.002, confidence = 0.7))
#Percobaan = Rules 623

rules <- model1

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SHAMPO, SABUN CU...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SABUN CUCI PAKAIAN, SNACK, MIE I...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SA...
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, SNACK, MARGARIN, KAPAS, TISU KERING, SABUN MA...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO, SABUN CUCI PAKAIAN, AIR MINERAL BOTOL, SN...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE IN...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	MIE INSTAN, GULA PUTIH, GARAM, PENYEDAP RASA, SUSU,...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHA...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, MARGARIN, TELUR, SUSU, PASTA GI...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, G...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, TELUR, AIR MINER...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, TISU BASAH, PEWANGI PAKAIAN, SUSU, SNAC...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, ...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, MARGARIN, DAGING AYAM, KOL, SNACK, PEW...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUS...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAI...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, PERMEN, ROTI, GULA P...

Gambar 5.207 Hasil Prediksi

	INPUT	REALITEM	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SNACK, SUSU, TELUR, SABUN MANDI, SHAMPO, SABUN CUCI PAKAIAN, SABUN CUCI PIRING, SOSIS, MINUMAN, MIE INSTAN, TEH, KOPI	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO, MINUMAN, SABUN CUCI PAKAIAN, SNACK, MIE INSTAN, SUSU, SIKAT GIGI, SABUN CUCI PIRING, PEWANGI PAKAIAN, ROTI	0/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	PENYEDAP RASA, BISKUIT, TEPUNG TERIGU, MINUMAN, SABUN MANDI, SABUN CUCI PAKAIAN, TELUR, KECAP MANIS, MIE INSTAN, SIKAT GIGI, SHAMPO, SAOS SAMBAL, SABUN CUCI PIRING, KOPI, BERAS	0/2
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, SNACK, MARGARIN, KAPAS, TISU KERING, SABUN MANDI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, MIE INSTAN, SABUN CUCI PIRING, TISU BASAH, GARAM, PEWANGI PAKAIAN, PASTA GIGI, TELUR, SABUN CUCI PAKAIAN, SAOS SAMBAL, MINUMAN, KOPI	1/1
5	MINUMAN, PASTA GIGI,	SAUS TIRAM	SHAMPO, SABUN CUCI PAKAIAN, AIR MINERAL BOTOL, SNACK, MIE INSTAN, SUSU, SIKAT GIGI, SABUN CUCI	0/1

	SABUN MANDI		PIRING, PEWANGI PAKAIAN, ROTI	
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SNACK, MIE INSTAN, ROTI, SHAMPO, SABUN MANDI, KOPI, SOSIS, SIKAT GIGI, MINYAK GORENG, BERAS, SUSU, TEH	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	MIE INSTAN, GULA PUTIH, GARAM, PENYEDAP RASA, SUSU, PEWANGI PAKAIAN, SAOS SAMBAL, SNACK, TELUR	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	TEH, TELUR, SNACK, TISU BASAH, SABUN CUCI MUKA, SHAMPO, BISKUIT, SABUN CUCI PIRING, APEL, MINUMAN, SUSU, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, SIKAT GIGI, SAOS SAMBAL, MINYAK GORENG, AIR MINERAL BOTOL, KOPI, KAPAS, BERAS, ROTI, ES KRIM	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, COKLAT, MARGARIN, TELUR, SUSU, PASTA GIGI, PERMEN, SIKAT GIGI, MIE INSTAN, SABUN MANDI, AIR MINERAL BOTOL, SHAMPO, SABUN CUCI PAKAIAN, SABUN CUCI PIRING, SOSIS, KOPI, TEH, ES KRIM	4/4
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	MIE INSTAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, GULA PUTIH, GARAM, PENYEDAP RASA, SUSU, SHAMPO, SIKAT GIGI, SABUN MANDI, TELUR, MINYAK GORENG, SNACK, PASTA GIGI	1/1

11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	COKLAT, TEPUNG TERIGU, GULA MERAH, TELUR, AIR MINERAL BOTOL, MIE INSTAN, SUSU, PERMEN, ROTI, GARAM, GULA PUTIH, SABUN CUCI PAKAIAN, SABUN MANDI, SHAMPO, PENYEDAP RASA, SABUN CUCI PIRING, SOSIS, SIKAT GIGI, SAOS SAMBAL, KECAP MANIS, MINUMAN, MINYAK GORENG, ES KRIM, TEH	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	MARGARIN, TISU BASAH, PEWANGI PAKAIAN, SUSU, SNACK, SIKAT GIGI, MIE INSTAN, AIR MINERAL BOTOL, KOPI, TELUR, KAPAS, SOSIS, PASTA GIGI, MINUMAN, MINYAK GORENG, BERAS, TEH	2/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	COKLAT, TEH, TELUR, TEPUNG TERIGU, SABUN CUCI MUKA, AIR MINERAL BOTOL, SUSU, APEL, PERMEN, ROTI, GULA PUTIH, GARAM, PENYEDAP RASA, KECAP MANIS, PEWANGI PAKAIAN, SIKAT GIGI, SABUN CUCI PAKAIAN, SABUN MANDI, SHAMPO, SABUN CUCI PIRING, SOSIS, SAOS SAMBAL, MINYAK GORENG, MINUMAN, BERAS, PASTA GIGI, ES KRIM	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, MARGARIN, DAGING AYAM, KOL, SNACK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, GULA PUTIH, PENYEDAP RASA, GARAM, KECAP MANIS, KOPI, SUSU, SHAMPO, SABUN MANDI, MINYAK GORENG, SOSIS, SIKAT GIGI, SAOS SAMBAL, MINUMAN, BERAS, ES KRIM, PERMEN	4/4
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, PASTA GIGI, AIR MINERAL BOTOL, SUSU, ROTI	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, SNACK, MIE INSTAN, SABUN CUCI PAKAIAN, GULA PUTIH, GARAM, SUSU, KOPI, ROTI, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, SOSIS, PASTA GIGI, BERAS, TEH	3/3

17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	COKLAT, KAPAS, TISU KERING, KOPI, PERMEN, ROTI, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, MIE INSTAN, SHAMPO, SIKAT GIGI, SABUN MANDI, SAOS SAMBAL, MINYAK GORENG, TISU BASAH, GARAM, SOSIS, PASTA GIGI, MINUMAN, BERAS, TEH, ES KRIM	1

Pada percobaan ketujuh ini menggunakan model1 yang menghasilkan 10 dari 17 yang terprediksi secara akurat.

8.) Percobaan Kedelapan

```
model10 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.001, confidence = 0.7))
#Percobaan = Rules 979647

rules <- model10

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	BAKSO, SUSU, TEPUNG TERIGU, TEH, BAWANG BOMBAY, KR...
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	TISU KERING, SHAMPO, SIKAT GIGI, SUSU, MIE INSTAN, KAC...
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	MINUMAN BUAH, RACUN TIKUS, TISU KERING, SABUN MA...
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, SEBLAK, AYAM GEPREK, SABUN MANDI, SABUN CUCI ...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SAOS SAMBAL, MARTABAK, SHAMPO, TISU KERING, SIKAT ...
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	KASA, LEM TIKUS, BOX, SNACK, BAKSO, BISKUIT, TEH, SEND...
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	SAOS TIRAM, LOTION, GULA DIABET, SAOS BULGOGI, CEND...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SAOS BULGOGI, CENDOL, SHAMPO, PELEMBUT PAKAIAN, K...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, SAOS SAMBAL, MARTABAK, CERMIN, KERTAS ...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	MIE INSTAN, MINUMAN, MARTABAK, TAHU, TEMPE, SAOS B...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	MIE INSTAN, BUMBU INSTAN, SAOS SAMBAL, MATERAI, TIS...
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	PELEMBUT PAKAIAN, SUSU, SAOS SAMBAL, BISKUIT, PASTA ...
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	BUMBU INSTAN, COTTON BUDS, SAOS SAMBAL, MATERAI, ...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, ES KRIM, SNACK, BAKSO, SUSU, TEPUNG TERI...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, SAOS SAMBAL, MARTABAK, TEH, LAM...
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	MINUMAN BUAH, RACUN TIKUS, KASA, LEM TIKUS, BOX, S...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	SEBLAK, AYAM GEPREK, PELEMBUT PAKAIAN, COTTON BUD...

Gambar 5.208 Hasil Prediksi

	INPUT	REALTIME	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	BAKSO, SUSU, TEPUNG TERIGU, TEH, BAWANG BOMBAY, KRIM WAJAH, BERAS, TELUR, COKLAT, SIKAT GIGI, PASTA GIGI, PERMEN, SELAI, CABAI, PAKCOY, KOPI, SNACK, NUGGET, PARFUM, REPELLANT NYAMUK, MINUMAN, TISU KERING, SABUN MANDI, AIR MINERAL BOTOL, RUMPUT LAUT, SAUS TOMAT, KEJU, SOSIS, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, MIE INSTAN, TAHU, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, PENYEDAP RASA, KECAP MANIS, SHAMPO, WORTEL, PERALATAN MANDI, APEL, MINYAK GORENG, MADU, SIRUP, KORNET, ES KRIM, BISKUIT, MAKANAN ANJING, SELEDRI, SELIMUT, PEWARNA RAMBUT, BAKING SODA, JERUK, YOGHURT	1/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	TISU KERING, SHAMPO, SIKAT GIGI, SUSU, MIE INSTAN, KACANG, BISKUIT, LOTION, SABUN CUCI PAKAIAN, MINYAK TELON, BEDAK TABUR, PENGHARUM RUANGAN, KECAP ASIN, SAOS SAMBEL, CABAI BUBUK, PEMBALUT, PEWANGI PAKAIAN, PERMEN, KOPI, COKLAT, SNACK, ROTI, SIKAT BOTOL, CENTONG NASI, KAMPER, BUMBU INSTAN, SAOS SAMBAL, NUGGET, REPELLANT NYAMUK, PARFUM, MINUMAN, AIR MINERAL BOTOL, SPONS, SENDAL, TEH CELUP, MINYAK GORENG, TAHU, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, PENYEDAP RASA, KECAP MANIS, MAKANAN KOREA, SNACK BAYI, SABUN CUCI PIRING, SOSIS, LADA, YOGHURT, SABUN CUCI MUKA, SEREAL, ES KRIM, BAKSO, TEH, MANGKUK, GRANOLA, KRIM, SUP, PEWARNA RAMBUT, DEODORANT	1/1

3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	MINUMAN BUAH, RACUN TIKUS, TISU KERING, SABUN MANDI, SIKAT GIGI, SUSU, MIE INSTAN, CABAI BUBUK, TEPUNG KANJI, TEPUNG TERIGU, PENYEDAP RASA, TELUR, MINYAK TELON, BEDAK TABUR, PENGHARUM RUANGAN, SHAMPO, KECAP ASIN, SAOS SAMBEL, PEMBALUT, PEWANGI PAKAIAN, PERMEN, KOPI, COKLAT, SNACK, SABUN CUCI PAKAIAN, ROTI, SELAI, TEPUNG MAIZENA, KEJU, DAGING AYAM, NUGGET, SIKAT BOTOL, CENTONG NASI, KAMPER, BUMBU INSTAN, SAOS SAMBAL, SABUN CUCI PIRING, PEMBERSIH LANTAI, MENTEGA, KECAP MANIS, SENDAL, KERUPUK, GULA MERAH, KACANG, BERAS, SABUN CUCI MUKA, AIR MINERAL BOTOL, TAHU, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, WORTEL, APEL, PERALATAN MANDI, TEH, PARFUM, MADU, BAWANG MERAH, KOL, KENTANG, LADA, SOSIS, YOGHURT, BISKUIT, VITAMIN, WAFER, JUS, MINUMAN, SEREAL, BAKSO, MANGKUK, SUP, PELICIN PAKAIAN, PEWARNA RAMBUT, PEPAYA, MINYAK WIJEN, ES KRIM	2/2
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, SEBLAK, AYAM GEPREK, SABUN MANDI, SABUN CUCI PAKAIAN, BAKSO, MAKANAN ANJING, KENTANG, GORENGAN, SNACK, KEJU, KOPI, MIE INSTAN, ONIGIRI, YOGHURT, BISKUIT, SIKAT GIGI, PASTA GIGI, KACANG, GRANOLA, TISU KERING, TEH, SALAK, NANAS, PEPAYA, PIR, NUGGET, MINUMAN VITAMIN, VAPE, BUBUR, SABUN CUCI PIRING, LOTION, MAKANAN KOREA, TAHU, RUMPUT LAUT, TELUR, MINYAK TELON, BEDAK TABUR, PENGHARUM RUANGAN, TONER, PELEMBAB WAJAH, COKLAT, PEWANGI PAKAIAN, MINYAK GORENG, TISU BASAH, KORNET, KAPAS, WAFER, PERMEN, PARFUM, MINUMAN, AIR MINERAL BOTOL, SABUN CUCI MUKA, MASKER, SOSIS, PENYEDAP RASA, MINUMAN BERKARBONASI, SEMANGKA, ES KRIM, BUMBU INSTAN, SPONS, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, GARAM, GULA PUTIH, MINUMAN KESEHATAN, KECAP MANIS, SNACK BAYI, SIRUP, MADU, POPOK, MARGARIN, KERUPUK, OBAT, JERUK, TEH CELUP, SAOS SAMBAL, WAFLE, LEM, MANGKUK, BEDAK BAYI, KRIM, SAOS GOCHUJANG, SELIMUT, SUP, PELICIN PAKAIAN, PISANG, TEPUNG SERBAGUNA, REPELLANT NYAMUK, SAUS TOMAT, SELAI, LADA, DEODORANT, OBAT NYAMUK, VITAMIN, BERAS, SEREAL, MINUMAN BUAH	1/1
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SAOS SAMBAL, MARTABAK, SHAMPO, TISU KERING, SIKAT GIGI, SUSU, MIE INSTAN, KACANG, BISKUIT, UDANG, ES BUAH, JUS, TEH, LOTION, SABUN CUCI PAKAIAN, MINYAK TELON, BEDAK TABUR, PENGHARUM RUANGAN, PERALATAN MANDI, HANDUK, POPOK, PEMBALUT, KECAP ASIN, SAOS SAMBEL, CABAI BUBUK, PEWANGI PAKAIAN, PERMEN, KOPI, COKLAT, SNACK, ROTI, SIKAT BOTOL, CENTONG NASI, KAMPER, BUMBU INSTAN, NUGGET, REPELLANT NYAMUK, PARFUM, AIR MINERAL BOTOL, SPONS, SENDAL, TEH CELUP, MINYAK GORENG, RUMPUT LAUT, SAUS TOMAT, KEJU, SOSIS, SABUN CUCI PIRING, TAHU, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, PENYEDAP RASA, KECAP MANIS, MAKANAN KOREA, SNACK BAYI, ES KRIM,	0/1

			BERAS, LADA, YOGHURT, SABUN CUCI MUKA, TELUR, KORNET, SEREAL, BAKSO, MANGKUK, GRANOLA, KRIM, SUP, PEWARNA RAMBUT, KERUPUK, DEODORANT	
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	KASA, LEM TIKUS, BOX, SNACK, BAKSO, BISKUIT, TEH, SENDAL, CUTTER, MINUMAN KESEHATAN, TELUR, MINUMAN VITAMIN, VAPE, BUBUR, KOPI, SUSU, AIR MINERAL BOTOL, KECAP ASIN, SAOS SAMBEL, CABAI BUBUK, PEMBALUT, PEWANGI PAKAIAN, PASTA GIGI, MIE INSTAN, SIKAT GIGI, PEWARNA RAMBUT, COKLAT, ROTI, WAFER, YOGHURT, PENYEDAP RASA, MINYAK WIJEN, MINYAK GORENG, SABUN CUCI PAKAIAN, TISU KERING, KECAP MANIS, MENTEGA, SAOS SAMBAL, RUMPUT LAUT, SAUS TOMAT, KEJU, SOSIS, MINUMAN, SABUN CUCI MUKA, SPONS, POPCORN, MAKANAN KOREA, SNACK BAYI, PARFUM, SHAMPO, SABUN MANDI, WORTEL, PERALATAN MANDI, APEL, BERAS, MARGARIN, ROKOK, OBAT, SAOS TIRAM, TEPUNG TERIGU, VITAMIN, KUE, SEREAL, MINUMAN BUAH, ES KRIM, NUGGET, MARSHMALLOW, TEPUNG SERBAGUNA, PEMUTIH, MAKANAN BERAT, MESES, ONIGIRI, DEODORANT, LOTION, MINUMAN BERKARBONASI, GULA PUTIH	1/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	SAOS TIRAM, LOTION, GULA DIABET, SAOS BULGOGI, CENDOL, KOPI, SABUN CUCI MUKA, DUMPLING, ES KRIM, NUGGET, PUDING, AIR MINERAL BOTOL, MIE INSTAN, FLA, SO'UN, AGAR-AGAR, BAKSO, SAOS SAMBAL, SNACK, CABAI BUBUK, SAOS SAMBEL, PEMBALUT, PEWANGI PAKAIAN, PASTA GIGI, PERMEN, BAWANG MERAH, BAWANG BOMBAY, DAUN BAWANG, PENYEDAP RASA, SIKAT BOTOL, CENTONG NASI, PENGHARUM RUANGAN, TISU KERING, SABUN CUCI PAKAIAN, SABUN MANDI, PEMBERSIH LANTAI, MENTEGA, SABUN CUCI PIRING, MINYAK GORENG, TELUR, SUSU, SPONS, TAHU, JAGUNG, SARDEN, DAGING SAPI, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, SHAMPO, ROTI, VITAMIN, SNACK BAYI, PARFUM, MADU, DAGING AYAM, TEH, WAFER, JUS, BERAS, MINUMAN BUAH, BISKUIT, SEREAL	1/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SAOS BULGOGI, CENDOL, SHAMPO, PELEMBUT PAKAIAN, KOPI, SUSU, SAOS SAMBAL, BISKUIT, COKLAT, AIR MINERAL BOTOL, MINYAK WIJEN, KEJU, SIKAT GIGI, KACANG, NUGGET, PUDING, DAGING SAPI, SOSIS, BERAS, FLA, SO'UN, AGAR-AGAR, BAKSO, TEH, ES KRIM, SNACK, BATERAI, MINYAK KELAPA, COTTON BUDS, KAPAS, SUNSCREEN, CAT KUKU, JAMUR, UDANG, JUS, MINUMAN, TEPUNG RAGI, BAKING POWDER, BAKING SODA, PLASTIK, PENYEDAP RASA, LOTION, KRIM, SERUM, SELADA, ANGGUR, TOMAT, APEL, MINYAK TELON, BEDAK TABUR, TUSUK GIGI, ROKOK, TAUGE, PEWANGI RUANGAN, TONER, CABAI, IKAN, DAGING AYAM, PERALATAN MANDI, POPOK, HANDUK, PEMBALUT, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, SAOS TIRAM, KECAP ASIN, KECAP MANIS, TIMUN, KANGKUNG, KOL, WORTEL, SAOS SAMBEL, CABAI BUBUK, PERMEN, MINYAK GORENG, TELUR, ROTI, TISU BASAH, KORNET, PISANG,	3/4

			TEPUNG TERIGU, TEPUNG MAIZENA, YOGHURT, PEPAYA, MASKER, HAND SANITIZER, OBAT NYAMUK, SABUN CUCI MUKA, SIKAT BOTOL, CENTONG NASI, MAKANAN KOREA, REPELLANT NYAMUK, PARFUM, PEMBERSIH LANTAI, SABUN CUCI PIRING, MENTEGA, SPONS, SENDAL, TEH CELUP, POPCORN, GAS, RUMPUT LAUT, SAUS TOMAT, TAHU, JAGUNG, SARDEN, DAUN BAWANG, GARAM, GULA PUTIH, MINUMAN KESEHATAN, SNACK BAYI, VITAMIN, WAFER, MINUMAN BERKARBONASI, LADA, DEODORANT, SEREAL, MINUMAN BUAH, MATERAI, TEPUNG BERAS, MANGKUK, GRANOLA, KENCUR, BEDAK BAYI, ES BUAH, SUP, PELICIN PAKAIAN, PEWARNA RAMBUT, PEMUTIH, AYAM GORENG, MINUMAN ENERGI, MADU, ONIGIRI, KERUPUK, KENTANG, WAFLE	
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	TISU KERING, SAOS SAMBAL, MARTABAK, CERMIN, KERTAS NASI, COTTON BUDS, ES KRIM, TEH, BAKSO, SUSU, TEPUNG TERIGU, KENTANG, GORENGAN, SABUN CUCI PIRING, BISKUIT, KOPI, MIE INSTAN, POPOK, UDANG, ES BUAH, JUS, KECAP MANIS, AYAM GORENG, BAWANG BOMBAY, KRIM WAJAH, BERAS, TELUR, ROKOK, PERALATAN MANDI, HANDUK, PEMBALUT, COKLAT, PASTA GIGI, SUNSCREEN, LIP PRODUCT, DEODORANT, SABUN CUCI MUKA, SIKAT GIGI, PERMEN, SELAI, CABAI, PAKCOY, MARGARIN, NUGGET, SABUN MANDI, AIR MINERAL BOTOL, TEMULAWAK, RUMPUT LAUT, SAUS TOMAT, KEJU, SOSIS, SABUN CUCI PAKAIAN, MAKANAN BERAT, KUE, WAFER, TAHU, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, PENYEDAP RASA, SHAMPO, MAKANAN KOREA, SNACK BAYI, PEWANGI PAKAIAN, WORTEL, APEL, MINYAK GORENG, MADU, SIRUP, KORNET, KACANG, LOTION, TISU BASAH, VITAMIN, MINUMAN BUAH, PEMBERSIH LANTAI, YOGHURT, PENGHARUM RUANGAN, MAKANAN ANJING, SELEDRI, LAMPU, TUSUK GIGI, SELIMUT, SUP, PEWARNA RAMBUT, BAKING SODA, TEPUNG SERBAGUNA, POPCORN, MESES, OBAT, KERUPUK, JERUK, TEH CELUP, SEREAL, BUMBU INSTAN, MINUMAN BERKARBONASI	4/4
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	MIE INSTAN, MINUMAN, MARTABAK, TAHU, TEMPE, SAOS BULGOGI, CENDOL, BAKSO, KOPI, TISU KERING, BISKUIT, MATERAI, SAOS TIRAM, SAOS TOMAT, MINYAK WIJEN, TEPUNG BERAS, NUGGET, PUDING, AIR MINERAL BOTOL, FLA, SO'UN, AGAR-AGAR, SNACK, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, KECAP ASIN, BAWANG MERAH, BAWANG PUTIH, LADA, DAUN BAWANG, CABAI BUBUK, SAOS SAMBEL, PEMBALUT, PASTA GIGI, PERMEN, MINYAK GORENG, SABUN CUCI PAKAIAN, TELUR, SUSU, MASKER, HAND SANITIZER, COTTON BUDS, OBAT NYAMUK, SABUN CUCI MUKA, SIKAT BOTOL, CENTONG NASI, PENGHARUM RUANGAN, SABUN MANDI, PEMBERSIH LANTAI, MENTEGA, SABUN CUCI PIRING, SPONS, JAGUNG, DAGING SAPI, KAPAS, GARAM, GULA PUTIH, MINUMAN KESEHATAN, PENYEDAP RASA, SHAMPO, ROTI, MAKANAN KOREA, SNACK BAYI, VITAMIN, PARFUM, SIKAT GIGI, MADU, TEH, WAFER, JUS, BERAS, SEREAL, MINUMAN BUAH, SOSIS, PELICIN PAKAIAN,	1/1

			MINUMAN BERKARBONASI	
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	MIE INSTAN, BUMBU INSTAN, SAOS SAMBAL, MATERAI, TISU KERING, ES KRIM, TEH, KENTANG, GORENGAN, SUSU, KEJU, SEMANGKA, MELON, JAMUR, DAGING AYAM, ONIGIRI, LEM, YOGHURT, SABUN CUCI PIRING, BAKSO, PERMEN, KACANG, SHAMPO, SABUN MANDI, DAGING SAPI, KENCUR, SOSIS, PULPEN, PENSIL, BATERAI, MINYAK KELAPA, AGAR-AGAR, KAPAS, PENGHARUM RUANGAN, POPOK, SUNSCREEN, CAT KUKU, MINUMAN VITAMIN, VAPE, BUBUR, KECAP MANIS, SIKAT GIGI, SERUM, COKLAT, SABUN CUCI PAKAIAN, AYAM GORENG, BAWANG BOMBAY, KRIM WAJAH, TELUR, ROTI, LOTION, PELEMBAB WAJAH, AIR MINERAL BOTOL, MINUMAN, KECAP ASIN, SAOS SAMBEL, CABAI BUBUK, PEMBALUT, PEWANGI PAKAIAN, PASTA GIGI, MINYAK GORENG, LIP PRODUCT, DEODORANT, SABUN CUCI MUKA, TISU BASAH, PISANG, KORNET, TEPUNG TERIGU, WAFER, MASKER, HAND SANITIZER, OBAT NYAMUK, MINUMAN KESEHATAN, CABAI, PAKCOY, MARGARIN, NUGGET, PARFUM, TEMULAWAK, GULA MERAH, RUMPUT LAUT, MAKANAN BERAT, KUE, MAKANAN KOREA, SNACK BAYI, WORTEL, PERALATAN MANDI, APEL, OBAT, KERUPUK, VITAMIN, MINUMAN BERKARBONASI, JUS, MINUMAN BUAH, GULA PUTIH, GARAM, PENYEDAP RASA, WAFLE, MARSHMALLOW, GRANOLA, BEDAK BAYI, LAMPU, SUP, PELICIN PAKAIAN, TEPUNG MAIZENA, TEPUNG SERBAGUNA, PEMUTIH, REPELLANT NYAMUK, BIHUN, KERIPIK, SAUS TOMAT, POPCORN, SIRUP, MESES, TEH CELUP, SEREAL, PEMBERSIH LANTAI	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	PELEMBUT PAKAIAN, SUSU, SAOS SAMBAL, BISKUIT, PASTA GIGI, BAKSO, COKLAT, AIR MINERAL BOTOL, TEPUNG TERIGU, TEH, SNACK, KACANG, GRANOLA, SUNSCREEN, CAT KUKU, JAMUR, KOPI, MINUMAN VITAMIN, VAPE, BUBUR, TEPUNG RAGI, BAKING POWDER, BAKING SODA, PLASTIK, PENYEDAP RASA, LOTION, KRIM, SIKAT GIGI, BERAS, SERUM, ES KRIM, MINYAK TELON, BEDAK TABUR, PENGHARUM RUANGAN, BAWANG BOMBAY, KRIM WAJAH, TELUR, TONER, PELEMBAB WAJAH, TAUGE, PEWANGI RUANGAN, CABAI, IKAN, DAGING AYAM, MIE INSTAN, PEWANGI PAKAIAN, MINYAK GORENG, PERMEN, SELAI, TISU BASAH, KORNET, PISANG, KAPAS, PEPAYA, NUGGET, SIKAT BOTOL, CENTONG NASI, KAMPER, BUMBU INSTAN, PAKCOY, MARGARIN, MINYAK WIJEN, REPELLANT NYAMUK, PARFUM, MINUMAN, PEMBERSIH LANTAI, KECAP MANIS, MENTEGA, SABUN CUCI MUKA, MASKER, SOSIS, UDANG, YOGHURT, RUMPUT LAUT, SAUS TOMAT, KEJU, SPONS, TAHU, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, GARAM, GULA PUTIH, MINUMAN KESEHATAN, MAKANAN KOREA, SNACK BAYI, WORTEL, PERALATAN MANDI, APEL, MADU, SIRUP, SAOS TIRAM, TEH CELUP, DEODORANT, SEREAL, MATERAI, MAKANAN ANJING, SELEDRI, BEDAK BAYI, SELIMUT, SUP, PELICIN PAKAIAN, PEWARNA RAMBUT, HAND SANITIZER, PEMUTIH, MESES, ONIGIRI, JERUK,	2/2

			VITAMIN, PEMBALUT	
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	BUMBU INSTAN, COTTON BUDS, SAOS SAMBAL, MATERAI, TISU KERING, ES KRIM, TEH, KENTANG, GORENGAN, SUSU, MINYAK WIJEN, KEJU, SEMANGKA, MELON, JAMUR, DAGING AYAM, ONIGIRI, LEM, YOGHURT, SABUN CUCI PIRING, SIKAT GIGI, PASTA GIGI, BAKSO, PERMEN, KACANG, SHAMPO, SABUN MANDI, NUGGET, AIR MINERAL BOTOL, DAGING SAPI, SOSIS, BERAS, PULPEN, PENSIL, POPOK, SUNSCREEN, CAT KUKU, MINUMAN VITAMIN, VAPE, BUBUR, UDANG, JUS, MINUMAN, KECAP MANIS, AYAM GORENG, SELADA, ANGGUR, TOMAT, APEL, LOTION, PELEMBAB WAJAH, TUSUK GIGI, ROKOK, PERALATAN MANDI, HANDUK, PEMBALUT, TIMUN, KANGKUNG, KOL, SAOS TIRAM, WORTEL, KECAP ASIN, SAOS SAMBEL, CABAI BUBUK, PEWANGI PAKAIAN, COKLAT, MINYAK GORENG, SABUN CUCI PAKAIAN, TELUR, LIP PRODUCT, DEODORANT, SABUN CUCI MUKA, TISU BASAH, PISANG, KORNET, KAPAS, TEPUNG TERIGU, TEPUNG MAIZENA, WAFER, MASKER, HAND SANITIZER, OBAT NYAMUK, PENGHARUM RUANGAN, MINUMAN KESEHATAN, SIKAT BOTOL, CENTONG NASI, KAMPER, MAKANAN KOREA, CABAI, PAKCOY, MARGARIN, ROTI, PARFUM, POPCORN, GAS, TEMULAWAK, RUMPUT LAUT, MAKANAN BERAT, KUE, TAHU, JAGUNG, SARDEN, DAUN BAWANG, GARAM, GULA PUTIH, PENYEDAP RASA, SNACK BAYI, MINUMAN BERKARBONASI, VITAMIN, MINUMAN BUAH, TEPUNG BERAS, WAFLE, MARSHMALLOW, GRANOLA, PUDING, KENCUR, BEDAK BAYI, LAMPU, ES BUAH, SUP, PELICIN PAKAIAN, TEPUNG SERBAGUNA, TAUGE, PEMUTIH, REPELLANT NYAMUK, BIHUN, KERIPIK, PEMBERSIH LANTAI, MENTEGA, MINUMAN ENERGI, SAUS TOMAT, SIRUP, MADU, MESES, OBAT, KERUPUK, TEH CELUP, SEREAL, MANGKUK	3/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MIE INSTAN, ES KRIM, SNACK, BAKSO, SUSU, TEPUNG TERIGU, PERMEN, BISKUIT, SENDAL, CUTTER, MINUMAN KESEHATAN, CABAI BUBUK, PENYEDAP RASA, MINYAK GORENG, POPOK, LAMPU, SUNSCREEN, CAT KUKU, JAMUR, TISU KERING, KOPI, MINUMAN VITAMIN, VAPE, BUBUR, UDANG, JUS, MINUMAN, MAKANAN KOREA, SAOS GOCHUJANG, TAHU, RUMPUT LAUT, SELADA, ANGGUR, TOMAT, KEJU, BAYAM, BROKOLI, BAWANG BOMBAY, KRIM WAJAH, BERAS, HANDUK, PEMBALUT, TIMUN, KANGKUNG, KOL, SAOS TIRAM, DAGING AYAM, COKLAT, SEMANGKA, JERUK, PEWANGI PAKAIAN, SABUN CUCI PAKAIAN, SIKAT GIGI, PASTA GIGI, SELAI, BAKING SODA, TISU BASAH, PISANG, KORNET, KAPAS, WAFER, YOGHURT, CABAI, PAKCOY, MARGARIN, MINYAK WIJEN, NUGGET, PARFUM, REPELLANT NYAMUK, SABUN MANDI, AIR MINERAL BOTOL, PEMBERSIH LANTAI, KECAP MANIS, MENTEGA, SAOS SAMBAL, TEMULAWAK, IKAN, SOSIS, SAUS TOMAT, POPCORN, ABON, MINUMAN BERKARBONASI, SABUN CUCI MUKA, SPONS, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, GARAM, GULA PUTIH, SHAMPO, SNACK BAYI, MADU, SIRUP, KENTANG, BAWANG MERAH, LADA, OBAT NYAMUK, VITAMIN, MAKANAN ANJING, SELEDRI, MARSHMALLOW, TEPUNG KANJI, ES BUAH, SELIMUT,	5/5

			PELICIN PAKAIAN, PEWARNA RAMBUT, TEPUNG SERBAGUNA, MESES, ONIGIRI, LOTION	
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	MIE INSTAN, SNACK, SAOS SAMBAL, MARTABAK, TEH, LAMPU, UDANG, ES BUAH, JUS, HANDUK, KECAP ASIN, SAOS SAMBEL, CABAI BUBUK, PEWANGI PAKAIAN, PASTA GIGI, PERMEN, KOPI, NUGGET, REPELLANT NYAMUK, PARFUM, TISU KERING, SABUN MANDI, AIR MINERAL BOTOL, ROTI, SUSU, ES KRIM, BIHUN, BISKUIT, RUMPUT LAUT, SAUS TOMAT, KEJU, SOSIS, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, APEL, WORTEL, BERAS, MINYAK GORENG, TELUR, SABUN CUCI MUKA, PENYEDAP RASA, KORNET, MINUMAN KESEHATAN, KERUPUK, SEREAL, SIKAT GIGI, COKLAT, YOGHURT	1/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	MINUMAN BUAH, RACUN TIKUS, KASA, LEM TIKUS, BOX, SNACK, SENDAL, CUTTER, MINUMAN KESEHATAN, PERMEN, CABAI BUBUK, TEPUNG KANJI, TEPUNG TERIGU, PENYEDAP RASA, MINUMAN VITAMIN, VAPE, BUBUR, KOPI, SUSU, MAKANAN KOREA, SAOS GOCHUJANG, TAHU, RUMPUT LAUT, BAWANG BOMBAY, KRIM WAJAH, BERAS, ROTI, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, SAOS TIRAM, KECAP ASIN, BUMBU INSTAN, SAOS SAMBEL, PEMBALUT, PASTA GIGI, MIE INSTAN, SABUN CUCI PAKAIAN, SELAI, BAKING SODA, TEPUNG MAIZENA, KEJU, DAGING AYAM, NUGGET, WAFER, YOGHURT, MASKER, HAND SANITIZER, COTTON BUDS, OBAT NYAMUK, SABUN CUCI MUKA, SIKAT BOTOL, CENTONG NASI, PENGHARUM RUANGAN, SAOS SAMBAL, TISU KERING, SABUN MANDI, CABAI, PAKCOY, MARGARIN, TEH, MINYAK WIJEN, SPONS, TEH CELUP, TEMULAWAK, KERUPUK, GULA MERAH, KACANG, IKAN, TISU BASAH, UDANG, SOSIS, SAUS TOMAT, MINUMAN, SEMANGKA, MINUMAN BERKARBONASI, ES KRIM, AIR MINERAL BOTOL, JAGUNG, SARDEN, DAGING SAPI, DAUN BAWANG, KAPAS, GARAM, GULA PUTIH, SHAMPO, SNACK BAYI, PARFUM, SIKAT GIGI, BISKUIT, WORTEL, PERALATAN MANDI, APEL, MADU, BAWANG MERAH, KOL, KENTANG, LADA, KORNET, VITAMIN, JUS, KUE, PELICIN PAKAIAN, PEPAYA, TEPUNG SERBAGUNA, SEREAL, COKLAT	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	SEBLAK, AYAM GEPREK, PELEMBUT PAKAIAN, COTTON BUDS, ES KRIM, TEH, SANTAN, INFUSED WATER, GULA MERAH, BAKSO, MAKANAN ANJING, ROTI, COKLAT, TISU KERING, KENTANG, GORENGAN, KEJU, KOPI, MIE INSTAN, ONIGIRI, YOGHURT, BISKUIT, SIKAT GIGI, PASTA GIGI, NUGGET, BUMBU INSTAN, PUDING, SENDAL, CUTTER, MINUMAN KESEHATAN, PERMEN, SALAK, NANAS, PEPAYA, PIR, CABAI BUBUK, TEPUNG TERIGU, PENYEDAP RASA, MINYAK GORENG, POPOK, MINUMAN VITAMIN, VAPE, BUBUR, KECAP MANIS, LOTION, KRIM, SHAMPO, SABUN MANDI, MAKANAN KOREA, SAOS GOCHUJANG, TAHU, RUMPUT LAUT, BERAS, SERUM, AYAM GORENG, BAWANG BOMBAY, KRIM WAJAH, ROKOK, MINUMAN, KECAP ASIN, SAOS SAMBEL, PEMBALUT, SUNSCREEN, LIP PRODUCT,	1/1

			DEODORANT, SABUN CUCI MUKA, SELAI, BAKING SODA, TISU BASAH, KORNET, KAPAS, DAGING AYAM, WAFER, MASKER, HAND SANITIZER, OBAT NYAMUK, SIKAT BOTOL, CENTONG NASI, KAMPER, PENGHARUM RUANGAN, SAOS SAMBAL, CABAI, PAKCOY, MARGARIN, MINYAK WIJEN, PARFUM, REPELLANT NYAMUK, BIHUN, PEMBERSIH LANTAI, MENTEGA, TEMULAWAK, IKAN, UDANG, SOSIS, SAUS TOMAT, SEMANGKA, MINUMAN BERKARBONASI, SPONS, MAKANAN BERAT, KUE, SARDEN, JAGUNG, DAGING SAPI, DAUN BAWANG, GARAM, GULA PUTIH, SNACK BAYI, WORTEL, PERALATAN MANDI, APEL, SIRUP, MADU, KACANG, KERUPUK, OBAT, JERUK, SAOS TIRAM, MINUMAN BUAH, WAFLE, LEM, MANGKUK, BEDAK BAYI, TEPUNG KANJI, LAMPU, PELEMBAB WAJAH, TUSUK GIGI, SELIMUT, SUP, PELICIN PAKAIAN, PISANG, TEPUNG SERBAGUNA, PEMUTIH, KERIPIK, MINUMAN ENERGI, POPCORN, MESES, LADA, TEH CELUP, JUS, SEREAL	

Pada percobaan kedelapan ini menggunakan model10 yang menghasilkan 16 dari 17 yang terprediksi secara akurat.

9.) Percobaan Kesembilan

```
model5 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.003, confidence = 0.8))
#Percobaan = Rules 77

rules <- model5

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	SABUN MANDI, SABUN CUCI PIRING
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	TELUR, MIE INSTAN, SABUN MANDI, SHAMPO, KECAP MAN...
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, MARGARIN, GULA PUTIH, PENYEDAP RASA, KECAP M...
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	SNACK, SABUN MANDI, MIE INSTAN, SABUN CUCI PAKAIAN
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	PENYEDAP RASA, GARAM, MIE INSTAN, SUSU, GULA PUTIH,...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SIKAT GIGI, TELUR, SABUN CUCI PIRING, SHAMPO, KECAP ...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	MARGARIN, MIE INSTAN, SIKAT GIGI, SABUN MANDI, SABU...
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	PENYEDAP RASA, GARAM, MIE INSTAN, TELUR, SUSU, GULA...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	SABUN MANDI, MIE INSTAN, SABUN CUCI PAKAIAN
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, MIE INSTAN, MINYAK GORENG
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	SIKAT GIGI, SABUN MANDI, SHAMPO, KECAP MANIS, SAOS ...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MARGARIN, SNACK, KECAP MANIS, MIE INSTAN, SABUN M...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	SNACK, PENYEDAP RASA, GARAM, MIE INSTAN, SABUN MA...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	GULA PUTIH, PENYEDAP RASA, KECAP MANIS, MIE INSTAN,...

Gambar 5.209 Hasil Prediksi

	INPUT	REALTIME	PREDICT	JML
1	ROTI, MARGARIN, MESES	PERMEN	SABUN MANDI, SABUN CUCI PIRING	0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO	0/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	TELUR, MIE INSTAN, SABUN MANDI, SHAMPO, KECAP MANIS, SABUN CUCI PAKAIAN	0/1
4	MESES, SHAMPO, SUSU	STIK KEJU	ROTI, MARGARIN, GULA PUTIH, PENYEDAP RASA, KECAP MANIS, SNACK, SABUN MANDI, GARAM	1/1
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN	KEJU	SNACK, SABUN MANDI, MIE INSTAN, SABUN CUCI	0/1

	CUCI PIRING		PAKAIAN	
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	PENYEDAP RASA, GARAM, MIE INSTAN, SUSU, GULA PUTIH, SAOS SAMBAL	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SIKAT GIGI, TELUR, SABUN CUCI PIRING, SHAMPO, KECAP MANIS, SAOS SAMBAL, MINYAK GORENG, KOPI	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	MARGARIN, MIE INSTAN, SIKAT GIGI, SABUN MANDI, SABUN CUCI PIRING	1/5
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	PENYEDAP RASA, GARAM, MIE INSTAN, TELUR, SUSU, GULA PUTIH	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	SABUN MANDI, MIE INSTAN, SABUN CUCI PAKAIAN	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI	KOPI, SUSU	MARGARIN, MIE INSTAN, MINYAK GORENG	0/1

	PAKAIAN, ROTI			
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	SIKAT GIGI, SABUN MANDI, SHAMPO, KECAP MANIS, SAOS SAMBAL, SABUN CUCI PAKAIAN, MINYAK GORENG	1/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MARGARIN, SNACK, KECAP MANIS, MIE INSTAN, SABUN MANDI, SAOS SAMBAL, SABUN CUCI PAKAIAN, MINYAK GORENG	1/4
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE		0/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	SNACK, PENYEDAP RASA, GARAM, MIE INSTAN, SABUN MANDI, SUSU, GULA PUTIH, SAOS SAMBAL, SABUN CUCI PAKAIAN	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	GULA PUTIH, PENYEDAP RASA, KECAP MANIS, MIE INSTAN, SABUN MANDI, GARAM, SAOS SAMBAL, MINYAK GORENG	0/1

Pada percobaan kesembilan ini menggunakan model5 yang menghasilkan 2 dari 17 yang terprediksi secara akurat.

10.) Percobaan Kesepuluh

```
model8 <- apriori(transaction_matrix, parameter = list(minlen=2,support = 0.004, confidence = 0.6))
#Percobaan = Rules 54

rules <- model18

result_dataframe <- generate_recommendations(inputs, rules)



# Menampilkan hasil

result_dataframe$Realtime <- df_test$`REAL ITEM`

result_dataframe <- result_dataframe[,c("Input","Realtime","Prediksi")]

View(result_dataframe)
```

	Input	Realtime	Prediksi
1	ROTI, MARGARIN, MESES	PERMEN	
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	MIE INSTAN, SABUN MANDI, TELUR, SHAMPO
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, PASTA GIGI, SNACK
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	SABUN CUCI PAKAIAN
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, S...	SAUS TIRAM	PENYEDAP RASA, GARAM, MIE INSTAN, SAOS SAMBAL, TEL...
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI ...	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SIKAT GIGI, PARFUM, SHAMPO, SAOS SAMBAL, KECAP MAN...
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	MARGARIN, MESES, MIE INSTAN, SIKAT GIGI, SUSU
10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECA...	MIE INSTAN	PENYEDAP RASA, GARAM, SABUN CUCI PAKAIAN, MIE INST...
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, ...	MIE INSTAN	MIE INSTAN, SUSU
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRIN...	KOPI, SUSU	MARGARIN, MESES, PASTA GIGI, MIE INSTAN
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	SIKAT GIGI, PARFUM, SAOS SAMBAL, KECAP MANIS, SABUN...
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PER...	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MARGARIN, MESES, SABUN CUCI PAKAIAN, KECAP MANIS, ...
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE	
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SAB...	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, GARAM, SABUN CUCI PAKAIAN, MIE INST...
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWA...	BERAS	KECAP MANIS, MIE INSTAN, SABUN MANDI, SHAMPO, KOPI...

Gambar 5.210 Hasil Prediksi

	INPUT	REALTIME	PREDICT	JML

1	ROTI, MARGARIN, MESES	PERMEN		0/1
2	SABUN MANDI, PASTA GIGI, SAOS TERIYAKI	TISU	SHAMPO	0/1
3	MINYAK GORENG, SPONS, TEH CELUP, PASTA GIGI	CEREAL, ES KRIM	MIE INSTAN, SABUN MANDI, TELUR, SHAMPO	0/2
4	MESES, SHAMPO, SUSU	STIK KEJU	MARGARIN, ROTI, SABUN MANDI, PASTA GIGI, SNACK	1/1
5	MINUMAN, PASTA GIGI, SABUN MANDI	SAUS TIRAM	SHAMPO	0/1
6	PERMEN, PEMBERSIH LANTAI, SABUN CUCI PIRING	KEJU	SABUN CUCI PAKAIAN	0/1
7	KECAP MANIS, INSEKTISIDA, PEMBERSIH KAMAR MANDI, SABUN CUCI TANGAN, KAMPER, BUMBU INSTAN, KECAP ASIN	SAUS TIRAM	PENYEDAP RASA, GARAM, MIE INSTAN, SAOS SAMBAL, TELUR	0/1
8	MIE INSTAN, BUMBU INSTAN, SABUN MANDI, SABUN CUCI PAKAIAN, TISU KERING, PENGHARUM RUANGAN, PEWANGI PAKAIAN, PASTA GIGI	KAPUR BARUS, CENTONG NASI, SAUS, SIKAT BOTOL	SIKAT GIGI, PARFUM, SHAMPO, SAOS SAMBAL, KECAP MANIS, TELUR	1/4
9	PARFUM, REPELLANT NYAMUK, SNACK, ROTI, MINUMAN	AIR MINERAL, TISU, SUSU, NUGGET, SABUN MANDI	MARGARIN, MESES, MIE INSTAN, SIKAT GIGI, SUSU	1/5

10	BUMBU INSTAN, PEWANGI PAKAIAN, SAOS SAMBAL, KECAP MANIS, SARDEN	MIE INSTAN	PENYEDAP RASA, GARAM, SABUN CUCI PAKAIAN, MIE INSTAN, TELUR	1/1
11	ROKOK, COTTON BUDS, TUSUK GIGI, KOPI, BISKUIT, BERAS, SNACK	MIE INSTAN	MIE INSTAN, SUSU	1/1
12	SABUN MANDI, SHAMPO, TISU KERING, SABUN CUCI PIRING, SABUN CUCI PAKAIAN, ROTI	KOPI, SUSU	MARGARIN, MESES, PASTA GIGI, MIE INSTAN	0/2
13	MIE INSTAN, SNACK, KOPI, BISKUIT	ES KRIM, SHAMPOO, MINUMAN TEH	SIKAT GIGI, PARFUM, SAOS SAMBAL, KECAP MANIS, SABUN MANDI, SHAMPO, SABUN CUCI PAKAIAN, TELUR, SUSU	1/3
14	SABUN CUCI PIRING, TEH, TELUR, WORTEL, APEL, ROTI, PERALATAN MANDI	BERAS, MINYAK, DETERJEN, INDOMIE, KOPI	MARGARIN, MESES, SABUN CUCI PAKAIAN, KECAP MANIS, MIE INSTAN, KOPI, SAOS SAMBAL	2/5
15	POPOK, PEMBALUT, MINUMAN, PERALATAN MANDI	INDOMIE		0/1
16	KECAP MANIS, MINYAK GORENG, PEWANGI PAKAIAN, SABUN CUCI PIRING, PEMBERSIH LANTAI, TELUR, MENTEGA	INDOMIE, SAUS, DETERJEN	PENYEDAP RASA, GARAM, SABUN CUCI PAKAIAN, MIE INSTAN, SAOS SAMBAL, KOPI	3/3
17	AIR MINERAL BOTOL, SUSU, TELUR, SNACK, VITAMIN, PEWANGI PAKAIAN, SABUN CUCI PIRING, SABUN CUCI PAKAIAN	BERAS	KECAP MANIS, MIE INSTAN, SABUN MANDI, SHAMPO, KOPI, SAOS SAMBAL	0/1

Pada percobaan ketujuh ini menggunakan model8 yang menghasilkan 3 dari 17 yang terprediksi secara akurat.

6. Analisa

Berdasarkan percobaan yang telah dilakukan untuk data fitting di atas, dapat dilihat bahwa yang menghasilkan rules nya banyak dapat memprediksi walaupun belum sepenuhnya akurat. Jika dianalisa kembali pada model yang memiliki support dan confidence yang masih tergolong cukup rendah dan hanya memiliki rules yang sedikit kemungkinan besar kurang representatif tidak dapat menangkap hubungan yang signifikan di antara produk. Sebaliknya jika model tersebut memiliki confidence yang tinggi memungkinkan untuk menghasilkan rules yang lebih banyak dan dapat memprediksi dengan baik.

Pada saat dilakukan percobaan pada data testing pun memiliki hasil yang sama, yaitu model yang memiliki rules yang banyak dapat memprediksi dengan baik dibandingkan model yang rulesnya sedikit.

Dari percobaan tersebut dapat dianalisis pengaruh dari perubahan parameter Pertama perubahan minlen dapat menghasilkan aturan yang lebih panjang dan spesifik, sementara nilai yang lebih rendah dapat menghasilkan aturan yang lebih umum. Kedua, tingginya support dapat menghasilkan aturan yang lebih langka tetapi lebih kuat, sementara tingkat yang lebih rendah dapat menghasilkan aturan yang lebih umum tetapi lebih lemah. Namun, rendahnya support tidak selalu buruk tetapi interpretasinya tergantung pada konteks dan tujuan analisis. Ketiga, tinggi-rendahnya confidence dapat memastikan aturan yang dihasilkan memiliki keterkaitan yang lebih kuat antara item pada lhs dan rhs.

Model terbaik untuk kasus kali ini dalam prediksi asosiasi market basket adalah model ke 12. Beberapa alasannya adalah model tersebut memiliki kombinasi support dan confidence yang menarik, selain itu aturan dengan lift tinggi menunjukkan keterkaitan yang kuat antar-item. Meskipun support rendah, confidence tinggi menandakan aturan-aturan yang dihasilkan cenderung lebih relevan. Lift tinggi pada rules ini, seperti

{BAWANG PUTIH} => {BAWANG MERAH} (lift = 249), menandakan hubungan yang kuat. Cocok untuk toko kelontong atau supermarket yang fokus pada penjualan produk makanan dan kebutuhan sehari-hari.

7. Kesimpulan

Dapat disimpulkan, bahwa model dengan algoritma apriori dapat melihat bagaimana pola pembelian pada retail dan dapat melakukan prediksi association rules dengan memberikan rekomendasi atau prediksi barang yang akan dibeli selanjutnya jika diketahui beberapa barang yang dibeli sebelumnya. Jadi, algoritma ini dapat digunakan untuk supermarket atau minimarket untuk meletakkan rak yang direkomendasikan oleh model.