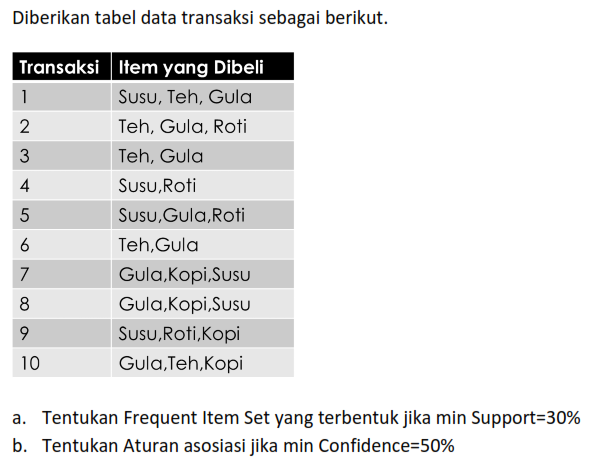
**TUGAS 3 – DATA MINING**



JAWAB

1. Pisahkan masing-masing item yang dibeli

|  |
| --- |
| Item yang dibeli |
| Susu |
| Teh |
| Gula |
| Roti |
| Kopi |

1. Tabel pembelian tiap item

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Transaksi | Susu | Teh | Gula | Roti | Kopi |
| 1 | 1 | 1 | 1 | 0 | 0 |
| 2 | 0 | 1 | 1 | 1 | 0 |
| 3 | 0 | 1 | 1 | 0 | 0 |
| 4 | 1 | 0 | 0 | 1 | 0 |
| 5 | 1 | 0 | 1 | 1 | 0 |
| 6 | 0 | 1 | 1 | 0 | 0 |
| 7 | 1 | 0 | 1 | 0 | 1 |
| 8 | 1 | 0 | 1 | 0 | 1 |
| 9 | 1 | 0 | 0 | 1 | 1 |
| 10 | 0 | 1 | 1 | 0 | 1 |
| Ʃ | 6 | 5 | 8 | 4 | 4 |

1. Tentukan ɸ

Misalkan ɸ = 3, maka kita dapat menentukan frekuen itemset. Dari tabel diatas diketahui total ɸ untuk transaksi k = 1, maka semua lebih besar dari ɸ. Maka:

Untuk k = 2, diperlukan tabel untuk tiap-tiap pasang item. Himpunan yang mungkin terbentuk adalah: {Susu, Teh}, {Susu, Gula}, {Susu, Roti}, {Susu, Kopi}, {Teh, Gula}, {Teh, Roti}, (Teh, Kopi}, {Gula, Roti}, {Gula Kopi}, {Roti, Kopi}.

Tabel-tabel untuk calon 2 item set:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T | Susu | Teh | f |  | T | Susu | Gula | f |  | T | Susu | Roti | f |
| 1 | 1 | 1 | P |  | **1** | 1 | 1 | P |  | **1** | 1 | 0 | S |
| 2 | 0 | 1 | S |  | **2** | 0 | 1 | S |  | **2** | 0 | 1 | S |
| 3 | 0 | 1 | S |  | **3** | 0 | 1 | S |  | **3** | 0 | 0 | S |
| 4 | 1 | 0 | S |  | **4** | 1 | 0 | S |  | **4** | 1 | 1 | P |
| 5 | 1 | 0 | S |  | **5** | 1 | 1 | P |  | **5** | 1 | 1 | P |
| 6 | 0 | 1 | S |  | **6** | 0 | 1 | S |  | **6** | 0 | 0 | S |
| 7 | 1 | 0 | S |  | **7** | 1 | 1 | P |  | **7** | 1 | 0 | S |
| 8 | 1 | 0 | S |  | **8** | 1 | 1 | P |  | **8** | 1 | 0 | S |
| 9 | 1 | 0 | S |  | **9** | 1 | 0 | S |  | **9** | 1 | 1 | P |
| 10 | 0 | 1 | S |  | **10** | 0 | 1 | S |  | **10** | 0 | 0 | S |
| Ʃ | | | 1 |  | **Ʃ** | | | 4 |  | **Ʃ** | | | 3 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T | Susu | Kopi | f |  | T | Teh | Gula | f |  | T | Teh | Roti | F |
| 1 | 1 | 0 | S |  | **1** | 1 | 1 | P |  | **1** | 1 | 0 | S |
| 2 | 0 | 0 | S |  | **2** | 1 | 1 | P |  | **2** | 1 | 1 | P |
| 3 | 0 | 0 | S |  | **3** | 1 | 1 | P |  | **3** | 1 | 0 | S |
| 4 | 1 | 0 | S |  | **4** | 0 | 0 | S |  | **4** | 0 | 1 | S |
| 5 | 1 | 0 | S |  | **5** | 0 | 1 | S |  | **5** | 0 | 1 | S |
| 6 | 0 | 0 | S |  | **6** | 1 | 1 | P |  | **6** | 1 | 0 | S |
| 7 | 1 | 1 | P |  | **7** | 0 | 1 | S |  | **7** | 0 | 0 | S |
| 8 | 1 | 1 | P |  | **8** | 0 | 1 | S |  | **8** | 0 | 0 | S |
| 9 | 1 | 1 | P |  | **9** | 0 | 0 | S |  | **9** | 0 | 1 | S |
| 10 | 0 | 1 | S |  | **10** | 1 | 1 | P |  | **10** | 1 | 0 | S |
| Ʃ | | | 3 |  | **Ʃ** | | | 4 |  | **Ʃ** | | | 1 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T | Teh | Kopi | f |  | T | Gula | Roti | f |  | T | Gula | Kopi | f |
| 1 | 1 | 0 | S |  | **1** | 1 | 0 | S |  | **1** | 1 | 0 | S |
| 2 | 1 | 0 | S |  | **2** | 1 | 1 | P |  | **2** | 1 | 0 | S |
| 3 | 1 | 0 | S |  | **3** | 1 | 0 | S |  | **3** | 1 | 0 | S |
| 4 | 0 | 0 | S |  | **4** | 0 | 1 | S |  | **4** | 0 | 0 | S |
| 5 | 0 | 0 | S |  | **5** | 1 | 1 | P |  | **5** | 1 | 0 | S |
| 6 | 1 | 0 | S |  | **6** | 1 | 0 | S |  | **6** | 1 | 0 | S |
| 7 | 0 | 1 | S |  | **7** | 1 | 0 | S |  | **7** | 1 | 1 | P |
| 8 | 0 | 1 | S |  | **8** | 1 | 0 | S |  | **8** | 1 | 1 | P |
| 9 | 0 | 1 | S |  | **9** | 0 | 1 | S |  | **9** | 0 | 1 | S |
| 10 | 1 | 1 | P |  | **10** | 1 | 0 | S |  | **10** | 1 | 1 | P |
| Ʃ | | | 1 |  | **Ʃ** | | | 2 |  | **Ʃ** | | | 3 |

|  |  |  |  |
| --- | --- | --- | --- |
| T | Roti | Kopi | f |
| 1 | 0 | 0 | S |
| 2 | 1 | 0 | S |
| 3 | 0 | 0 | S |
| 4 | 1 | 0 | S |
| 5 | 1 | 0 | S |
| 6 | 0 | 0 | S |
| 7 | 0 | 1 | S |
| 8 | 0 | 1 | S |
| 9 | 1 | 1 | P |
| 10 | 0 | 1 | S |
| Ʃ | | | 1 |

Dari tabel 2 unsur diatas, P artinya item yang dijual secara bersamaan, dan S berarti tidak ada item yang dijual secara bersamaan. Ʃ melambangkan jumlah Frekuensi item set. Jumlah frekuensi item set harus lebih besar atau sama dengan jumlah frekuensi item set (Ʃ >= ɸ). Dari tabel diatas maka didapat:

Kombinasi dari itemset dalam F2, dapat digabungkan menjadi 3 calon item set. Untuk k = 3 himpunan yang mungkin terbentuk adalah: {Susu, Gula, Roti}, {Susu, Gula, Kopi}, {Susu, Roti, Kopi}, {Teh, Gula, Kopi}.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T | Susu | Gula | Roti | f |  | T | Susu | Gula | Kopi | f |
| 1 | 1 | 1 | 0 | S |  | **1** | 1 | 1 | 0 | S |
| 2 | 0 | 1 | 1 | S |  | **2** | 0 | 1 | 0 | S |
| 3 | 0 | 1 | 0 | S |  | **3** | 0 | 1 | 0 | S |
| 4 | 1 | 0 | 1 | S |  | **4** | 1 | 0 | 0 | S |
| 5 | 1 | 1 | 1 | P |  | **5** | 1 | 1 | 0 | S |
| 6 | 0 | 1 | 0 | S |  | **6** | 0 | 1 | 0 | S |
| 7 | 1 | 1 | 0 | S |  | **7** | 1 | 1 | 1 | P |
| 8 | 1 | 1 | 0 | S |  | **8** | 1 | 1 | 1 | P |
| 9 | 1 | 0 | 1 | S |  | **9** | 1 | 0 | 1 | S |
| 10 | 0 | 1 | 0 | S |  | **10** | 0 | 1 | 1 | S |
| Ʃ | | | | 1 |  | **Ʃ** | | | | 2 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T | Susu | Roti | Kopi | f |  | T | Teh | Gula | Kopi | f |
| 1 | 1 | 0 | 0 | S |  | **1** | 1 | 1 | 0 | S |
| 2 | 0 | 1 | 0 | S |  | **2** | 1 | 1 | 0 | S |
| 3 | 0 | 0 | 0 | S |  | **3** | 1 | 1 | 0 | S |
| 4 | 1 | 1 | 0 | S |  | **4** | 0 | 0 | 0 | S |
| 5 | 1 | 1 | 0 | S |  | **5** | 0 | 1 | 0 | S |
| 6 | 0 | 0 | 0 | S |  | **6** | 1 | 1 | 0 | S |
| 7 | 1 | 0 | 1 | S |  | **7** | 0 | 1 | 1 | S |
| 8 | 1 | 0 | 1 | S |  | **8** | 0 | 1 | 1 | S |
| 9 | 1 | 1 | 1 | P |  | **9** | 0 | 0 | 1 | S |
| 10 | 0 | 0 | 1 | S |  | **10** | 1 | 1 | 1 | P |
| Ʃ | | | | 1 |  | **Ʃ** | | | | 1 |

Dari tabel diatas, didapatkan F3 = {}, karena tidak ada Ʃ >= ɸ sehingga F4, dst juga merupakan himpunan kosong.

1. Rule yang dipakai adalah ***if x then y***, dimana ***x*** adalah *antecendent* dan ***y*** adalah *consequent*. Berdasarkan rule tersebut, maka dibutuhkan 2 buah item yang mana salah satunya sebagai antecedent dan sisanya sebagai consequent. Dari langkah sebelumnya didapat 1 buah Fk yaitu F2. F1 tidak disertakan karena hanya terdiri dari 1 item saja. Untuk antecedent boleh lebih dari 1 unsur, sedangkan consequent terdiri dari 1 unsur.
2. Tentukan (ss-s) sebagai antecedent dan s sebagai consequent dari Fk yang telah didapat berdasarkan rule pada poin sebelumnya.

Pada F2 didapat himpunan F2 = {{Susu, Gula}, {Susu, Roti}, {Susu, Kopi}, {Teh, Gula}, {Gula, Kopi}}

Maka dapat disusun:

* Untuk {Susu, Gula}

Jika (ss-s) = Susu, Jika s = Gula, Maka **if buy Susu then buy Gula**

Jika (ss-s) = Gula, Jika s = Susu, Maka **if buy Gula then buy Susu**

* Untuk {Susu, Roti}

Jika (ss-s) = Susu, Jika s = Roti, Maka **if buy Susu then buy Roti**

Jika (ss-s) = Roti, Jika s = Susu, Maka **if buy Roti then buy Susu**

* Untuk {Susu, Kopi}

Jika (ss-s) = Susu, Jika s = Kopi, Maka **if buy Susu then buy Kopi**

Jika (ss-s) = Kopi, Jika s = Susu, Maka **if buy Kopi then buy Susu**

* Untuk {Teh, Gula}

Jika (ss-s) = Teh, Jika s = Gula, Maka **if buy Teh then buy Gula**

Jika (ss-s) = Gula, Jika s = Teh, Maka **if buy Gula then buy Teh**

* Untuk {Gula, Kopi}

Jika (ss-s) = Gula, Jika s = Kopi, Maka **if buy Gula then buy Kopi**

Jika (ss-s) = Kopi, Jika s = Gula, Maka **if buy Kopi then buy Gula**

1. Dari langkah sebelumnya, maka didapatkan 10 rule yang dapat digunakan yaitu:

* if buy Susu then buy Gula
* if buy Gula then buy Susu
* if buy Susu then buy Roti
* if buy Roti then buy Susu
* if buy Susu then buy Kopi
* if buy Kopi then buy Susu
* if buy Teh then buy Gula
* if buy Gula then buy The
* if buy Gula then buy Kopi
* if buy Kopi then buy Gula

1. Hitung support dan confidence

Sehingga didapatkan tabel dengan perhitungan sebagai berikut:

|  |  |  |
| --- | --- | --- |
| **If antecedent then consequent** | **support** | **confidence** |
| if buy Susu then buy Gula | (4/10) x 100% = 40% | (4/6) x 100% = 66,66% |
| if buy Gula then buy Susu | (4/10) x 100% = 40% | (4/8) x 100% = 50% |
| if buy Susu then buy Roti | (3/10) x 100% = 33,33% | (3/6) x 100% = 50% |
| if buy Roti then buy Susu | (3/10) x 100% = 33,33% | (3/4) x 100% = 75% |
| if buy Susu then buy Kopi | (3/10) x 100% = 33,33% | (3/6) x 100% = 50% |
| if buy Kopi then buy Susu | (3/10) x 100% = 33,33% | (3/4) x 100% = 75% |
| if buy Teh then buy Gula | (4/10) x 100% = 40% | (4/5) x 100% = 80% |
| if buy Gula then buy Teh | (4/10) x 100% = 40% | (4/8) x 100% = 50% |
| if buy Gula then buy Kopi | (3/10) x 100% = 33,33% | (3/8) x 100% = 37,5% |
| if buy Kopi then buy Gula | (3/10) x 100% = 33,33% | (3/4) x 100% = 75% |

1. Setelah didapatkan support dan confidence untuk masing-masing kandidat, dilakukan perkalian antara support dan confidence, dimana confidence-nya minimal 50%, sehingga didapatkan tabel sebagai berikut:

|  |  |  |  |
| --- | --- | --- | --- |
| **If antecedent then consequent** | **support** | **confidence** | **support x confidence** |
| if buy Susu then buy Gula | 40% | 66,66% | 0,266640 |
| if buy Gula then buy Susu | 40% | 50% | 0,200000 |
| if buy Susu then buy Roti | 33,33% | 50% | 0,166650 |
| if buy Roti then buy Susu | 33,33% | 75% | 0,249975 |
| if buy Susu then buy Kopi | 33,33% | 50% | 0,166650 |
| if buy Kopi then buy Susu | 33,33% | 75% | 0,249975 |
| if buy Teh then buy Gula | 40% | 80% | 0,320000 |
| if buy Gula then buy Teh | 40% | 50% | 0,200000 |
| if buy Kopi then buy Gula | 33,33% | 75% | 0,249975 |

1. Setelah didapat hasil perkalian antara support dan confidence, maka rule yang dipakai saat menjual adalah **if buy Teh then buy Gula** karena mendapatkan hasil perkalian yang paling besar.