

0 Global Code

0.1 Prepare

```
%load_ext sql
import pymysql
pymysql.install_as_MySQLdb()
%sql mysql://stu1900011102:stu1900011102@162.105.146.37:43306

%sql use stu1900011102;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.

[]
```

0.2 DEBUG

```
%sql show tables;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.

[]
```

1 Internship 3——Practice 4

1.1 Create Table

```
%%sql
set foreign_key_checks=0; #
drop table if exists Egg; #      Egg
#
create table Egg (    int,    char(10),    char(10),    char(10),    char(10));
insert into Egg values (1,' ',' ',' ',' '), (2,' ',' ',' ',' '), (3,' ',' ',' ',' '), (4,' ',' ',' ',' '),
set foreign_key_checks=1; #

select * from Egg;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.
0 rows affected.
10 rows affected.
0 rows affected.
10 rows affected.

[(1, ' ', ' ', ' ', ' '),
 (2, ' ', ' ', ' ', ' '),
```

```
(3, ' ', ' ', ' ', ' ', ' '),
(4, ' ', ' ', ' ', ' ', ' '),
(5, ' ', ' ', ' ', ' ', ' '),
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(7, ' ', ' ', ' ', ' ', ' '),
(8, ' ', ' ', ' ', ' ', ' '),
(9, ' ', ' ', ' ', ' ', ' '),
(10, ' ', ' ', ' ', ' ', ' ')]
```

1.2 Information Gain Calculation Formula

$$I(s_1, s_2, \dots, s_m) = -\sum_{i=1}^m p_i \log_2(p_i) \quad A = \{a_1, a_2, \dots, a_v\} \quad S = \{s_1, s_2, \dots, s_m\}$$

$$E(A) = \sum_{j=1}^v \frac{s_{1j}, s_{2j}, \dots, s_{mj}}{s} I(s_{1j}, s_{2j}, \dots, s_{mj}), \quad I(s_{1j}, s_{2j}, \dots, s_{mj}) = -\sum_{i=1}^m p_{ij} \log_s(p_{ij}), \quad p_{ij} = \frac{s_{ij}}{s_j}$$

$$\text{Gain}(A) = I(s_1, \dots, s_m) - E(A) = \text{Ent}(\quad) - \text{Ent}(\quad)$$

1.3 Entropy Calculation

```
%%sql
drop procedure if exists entropy;
create procedure entropy(in col varchar(10), out res float)
begin
    declare length float;
    # calculate distribution
    set @s = concat('create view e as select count(*) as count from Egg group by ', col);
    prepare stmt from @s;
    execute stmt;
    deallocate prepare stmt;
    set length = (select count(*) from Egg);
    # calculate entropy
    select sum(-(e.count / length) * LOG(e.count / length)) from e into res;
    drop view e;
end

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]
```

1.4 Conditional Entropy Calculation

```
%%sql
drop procedure if exists joined_entropy;
create procedure joined_entropy(in col1 varchar(10), in col2 varchar(10), out res float)
begin
```

```

declare length float;
# calculate distribution
set @s = concat('create view e as select count(*) as count from Egg group by ', col1, ');
prepare stmt from @s;
execute stmt;
deallocate prepare stmt;
set length = (select count(*) from Egg);
# calculate joined_entropy
select sum(-(e.count / length) * LOG(e.count / length)) from e into res;
drop view e;
end

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]

%%sql
drop procedure if exists conditional_entropy;
create procedure conditional_entropy(in col1 varchar(10), in col2 varchar(10), out res float)
begin
    declare res1 float;
    declare res2 float;
    call joined_entropy(col1, col2, res1);
    call entropy(col2, res2);
    set res = res1 - res2; #  $H(X/Y) = H(X,Y) - H(Y)$ 
end

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]

```

1.5 Information Gain Calculation

```

%%sql
drop procedure if exists information_gain;
create procedure information_gain(in col varchar(10), out res float)
begin
    declare res1 float;
    declare res2 float;
    call entropy(" ", res1);
    call conditional_entropy(" ", col, res2);
    set res = res1 - res2; # -
end

* mysql://stu1900011102:***@162.105.146.37:43306

```

```
0 rows affected.  
0 rows affected.
```

```
[]
```

1.6 Result Display

```
%%sql  
set @a=0;  
call information_gain(" ", @a);  
select @a;  
  
* mysql://stu1900011102:***@162.105.146.37:43306  
0 rows affected.  
0 rows affected.  
1 rows affected.  
  
[(0.17774081230163574,)]  
  
%%sql  
set @b=0;  
call information_gain(" ", @b);  
select @b;  
  
* mysql://stu1900011102:***@162.105.146.37:43306  
0 rows affected.  
0 rows affected.  
1 rows affected.  
  
[(0.2231435775756836,)]  
  
%%sql  
set @c=0;  
call information_gain(" ", @c);  
select @c;  
  
* mysql://stu1900011102:***@162.105.146.37:43306  
0 rows affected.  
0 rows affected.  
1 rows affected.  
  
[(0.38593024015426636,)]
```

2 Internship 3——Practice 5

2.1 Organize the Dataset

```
%sql select * from dataset.supermarketTrans; # supermarketTrans  
  
* mysql://stu1900011102:***@162.105.146.37:43306
```

350 rows affected.

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```

```
1NF supermarketTrans 1NF
```

```
%%sql
set foreign_key_checks=0; #
drop table if exists my_Trans;
create table my_Trans(cus_id int, no_trans int, tanggal Date, item varchar(100));
set foreign_key_checks=1;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.
0 rows affected.
0 rows affected.

[]

%%sql
```

```

drop procedure if exists create_my_trans;
create procedure create_my_trans(out tranSum int)
begin
    declare cnt int;
    declare idx int;
    declare curID int;
    declare curNo int;
    declare curDate Date;
    declare curItems varchar(1000);
    declare c cursor for ( #
        select Customer_ID as _id, No_Transaksi as _no, Tanggal as _date, Items as _items fr
    );
    select count(*) into cnt from dataset.supermarketTrans;
    select count(*) into tranSum from dataset.supermarketTrans;

    open c;
    while cnt > 0 do
        fetch c into curID, curNo, curDate, curItems;
        set curItems = replace(curItems, " ", ""); # ? L1 Deterjen
        set idx = locate(",", curItems);
        while idx >= 1 do
            insert into my_Trans(cus_id, no_trans, tanggal, item) values (curID, curNo, curDate, curItems);
            set curItems = substring(curItems, idx + 1, length(curItems) - idx);
            set idx = locate(",", curItems);
        end while;
        if curItems != '' then #
            insert into my_Trans(cus_id, no_trans, tanggal, item) values (curID, curNo, curDate, curItems);
        end if;
        set cnt=cnt-1;
    end while;
    close c;

end;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]

%%sql
truncate table my_Trans; # table

set @tranSum = 0; #
call create_my_trans(@tranSum);
select @tranSum

* mysql://stu1900011102:***@162.105.146.37:43306

```

0 rows affected.
0 rows affected.
1 rows affected.
1 rows affected.

[(350,)]

%sql select * from my_Trans; # 1NF

* mysql://stu1900011102:***@162.105.146.37:43306
1760 rows affected.

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```

1NF

2.2 First-order Frequent Item-sets

```
%%sql
set foreign_key_checks=0;
drop table if exists L1_sets;
create table L1_sets(item varchar(100), support float); # support item
set foreign_key_checks=1;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.
0 rows affected.
0 rows affected.

[]

%%sql
drop procedure if exists create_L1_sets;
create procedure create_L1_sets(in std_support float)
begin

    insert into L1_sets(item, support)
        select item, count(*)/@tranSum from my_Trans
        group by item
        having count(*)/@tranSum >= std_support;

end;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]

= 0.4

%%sql
truncate table L1_sets; #      table

call create_L1_sets(0.40000); #      std_support = 0.4

select * from L1_sets;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
```

```

9 rows affected.
9 rows affected.

[('Telur', 0.728571),
 ('Minyak', 0.662857),
 ('Permen', 0.502857),
 ('Tepung', 0.68),
 ('Deterjen', 0.468571),
 ('Kecap', 0.52),
 ('Susu', 0.462857),
 ('Sabun', 0.494286),
 ('Snack', 0.508571)]

```

2.2 Second-order Frequent Item-sets

```

%%sql
set foreign_key_checks=0;
drop table if exists L2_sets;
create table L2_sets(item1 varchar(100), item2 varchar(100), support float); # support item
set foreign_key_checks=1;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.
0 rows affected.
0 rows affected.

[]

%%sql
drop procedure if exists create_L2_sets;
create procedure create_L2_sets(in std_support float)
begin

    insert into L2_sets(item1, item2, support)
        select R.item, S.item, count(*)/@tranSum
        from my_Trans as R, my_Trans as S,
        (
            select Lset1.item as it1, Lset2.item as it2
            from L1_sets as Lset1, L1_sets as Lset2
            where Lset1.item < Lset2.item
        ) as L1Concat # concat
        where R.cus_id = S.cus_id and R.no_trans = S.no_trans and R.tanggal = S.tanggal and
        group by R.item, S.item
        having count(*)/@tranSum >= std_support;

```

```

end;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]

= 0.4

%%sql
truncate table L2_sets; #      table

call create_L2_sets(0.4); #      std_support = 0.4

select * from L2_sets;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
3 rows affected.
3 rows affected.

[('Minyak', 'Telur', 0.574286),
 ('Minyak', 'Tepung', 0.525714),
 ('Telur', 'Tepung', 0.565714)]

```

2.3 Third-order Frequent Item-sets

```

%%sql
set foreign_key_checks=0;
drop table if exists L3_sets;
create table L3_sets(item1 varchar(100), item2 varchar(100), item3 varchar(100), support float);
set foreign_key_checks=1;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.
0 rows affected.
0 rows affected.

[]

K-1      K

%%sql
drop procedure if exists create_L3_sets;
create procedure create_L3_sets(in std_support float)
begin

```

```

insert into L3_sets(item1, item2, item3, support)
select t1.item, t2.item, t3.item, count(*)/@tranSum
from my_Trans as t1, my_Trans as t2, my_Trans as t3,
(
select tmpL2Concat.it1 as it1, tmpL2Concat.it2 as it2, tmpL2Concat.it3 as it3
from
(
select Lset1.item1 as it1, Lset1.item2 as it2, Lset2.item2 as it3
from L2_sets as Lset1, L2_sets as Lset2
where Lset1.item1 = Lset2.item1 and Lset1.item2 < Lset2.item2 #
) as tmpL2Concat
where exists (select * from L2_sets where tmpL2Concat.it1 = L2_sets.item1 and tr
exists (select * from L2_sets where tmpL2Concat.it1 = L2_sets.item1 and tr
exists (select * from L2_sets where tmpL2Concat.it2 = L2_sets.item1 and tr
)as L2Concat
where t1.cus_id = t2.cus_id and t1.no_trans = t2.no_trans and t1.tanggal = t2.tanggal
t2.cus_id = t3.cus_id and t2.no_trans = t3.no_trans and t2.tanggal = t3.tanggal and
t1.item = L2Concat.it1 and t2.item = L2Concat.it2 and t3.item = L2Concat.it3

group by t1.item,t2.item,t3.item
having count(*)/@tranSum >= std_support;

end;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
0 rows affected.

[]

= 0.4

%%sql
truncate table L3_sets; #
call create_L3_sets(0.4); #
select * from L3_sets;

* mysql://stu1900011102:***@162.105.146.37:43306
0 rows affected.
1 rows affected.
1 rows affected.

[('Minyak', 'Telur', 'Tepung', 0.485714)]

```