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E06 Queries on KB

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1 Problem Description

Given a KB `Restaurants.pl`, which describes the distribution of branches of 10 well-known restaurants in Guangzhou.

For example, `restaurant(ajukejiacai,2007,yuecai)` means that `ajukejiacai` was founded in 2007 and is a restaurant of `yuecai`. `branch(ajukejiacai,xintiandi)` means that `ajukejiacai` has a branch in `xintiandi`. `district(xintiandi,panyu)` means that `xintiandi` is an area of `panyu` district.

Please formulate each of the following questions as a query using Prolog's notation, pose it to Prolog, and obtain Prolog's answer:

1. What restaurants have branches in beigang?
2. What districts have restaurants of yuecai and xiangcai?
3. What restaurants have the least number of branches?
4. What areas have two or more restaurants?
5. Which restaurant has the longest history?
6. What restaurants have at least 10 branches?

Please define the new relation below using Prolog and test it.

- sameDistrict(Restaurant1, Restaurant2): Restaurant1 and Restaurant2 have one or more branches in the same district.

You should write down a listing that shows the queries you submitted to Prolog, and the answer returned. Hand in a file named E06_YourNumber.pdf, and send it to ai_201901@foxmail.com

2 Codes and Results

```
1. setof(A,(branch(A,beigang)),Res).

2. setof(C,((restaurant(A,_,yuecai),branch(A,B),district(B,C),
    restaurant(D,_,xiangcai),branch(D,F),district(F,C))),Res).

```

```
3.setof(A1,(Y^Y2^(setof(B1,branch(A1,B1),Results1),length(Results1
    ,Y),\+ (setof(B2,branch(A2,B2),Results2),length(Results2,Y2),\+
    Y=<Y2))),Res).
% 这里不用Y^Y2 也是可以的，因为prolog 语言中的变量默认是按照存在来寻找的，
    变量为存在量词，同理5 也是如此
4.setof(B,(setof(A,branch(A,B),Results),length(Results,C),C>=2),
    Res).
5.setof(A1,(Y^Y2^(restaurant(A1,Y,_),\+ (restaurant(A2,Y2,_),\+ Y
    =<Y2))),Res).
6.setof(A,(setof(B,branch(A,B),Results),length(Results,C),C>=10),
    Res).

7.sameDistrict(A,B):-branch(A,C),branch(B,D),C=D,A\=B.
query:findall(pair(A,B),sameDistrict(A,B),Res).
```

```
?- setof(A,(branch(A,beigang)),Res).
Res = [huangmenjimifan, mixuebingcheng, shaxianxiaochi].

?- setof(C,((restaurant(A,_,yuecai),branch(A,B),district(B,C),restaurant(D,_,xiangcai),branch(D,F
),district(F,C))),Res).
A = ajukejiacai,
B = xintiandi,
D = tongxianghui,
F = maoshengdasha,
Res = [panyu] .

?- setof(A1,(Y^Y2^(setof(B1,branch(A1,B1),Results1),length(Results1,Y),\+ (setof(B2,branch(A2,B2)
,Results2),length(Results2,Y2),\+ Y=<Y2))),Res).
Results1 = [xintiandi, zhilanwan],
Res = [hongmenyan].

?- setof(B,(setof(A,branch(A,B),Results),length(Results,C),C>=2),Res).
Results = [ajukejiacai, hongmenyan, mixuebingcheng, yangguofu],
C = 4,
Res = [xintiandi] .

?- setof(A1,(Y^Y2^(restaurant(A1,Y,_),\+ (restaurant(A2,Y2,_),\+ Y=<Y2))),Res).
Res = [huangmenjimifan].

?- setof(A,(setof(B,branch(A,B),Results),length(Results,C),C>=10),Res).
Results = [bainaohui, hanting, huizhoudasha, kaifadadao, maoshengdasha, shimaocheng, tianhebei, y
ongfu, yuanyangmingyuan|...],
C = 10,
Res = [tongxianghui] .

?- findall(pair(A,B),sameDistrict(A,B),Res).
Res = [pair(mixuebingcheng, ajukejiacai), pair(mixuebingcheng, hongmenyan), pair(mixuebingcheng,
yangguofu), pair(mixuebingcheng, huangmenjimifan), pair(mixuebingcheng, shaxianxiaochi), pair(mix
uebingcheng, diandude), pair(muwushaokao, dagangxianmiaoshaoji), pair(diandude, tongxianghui), pa
ir(..., ...)|...].

?-
```

图 1: result