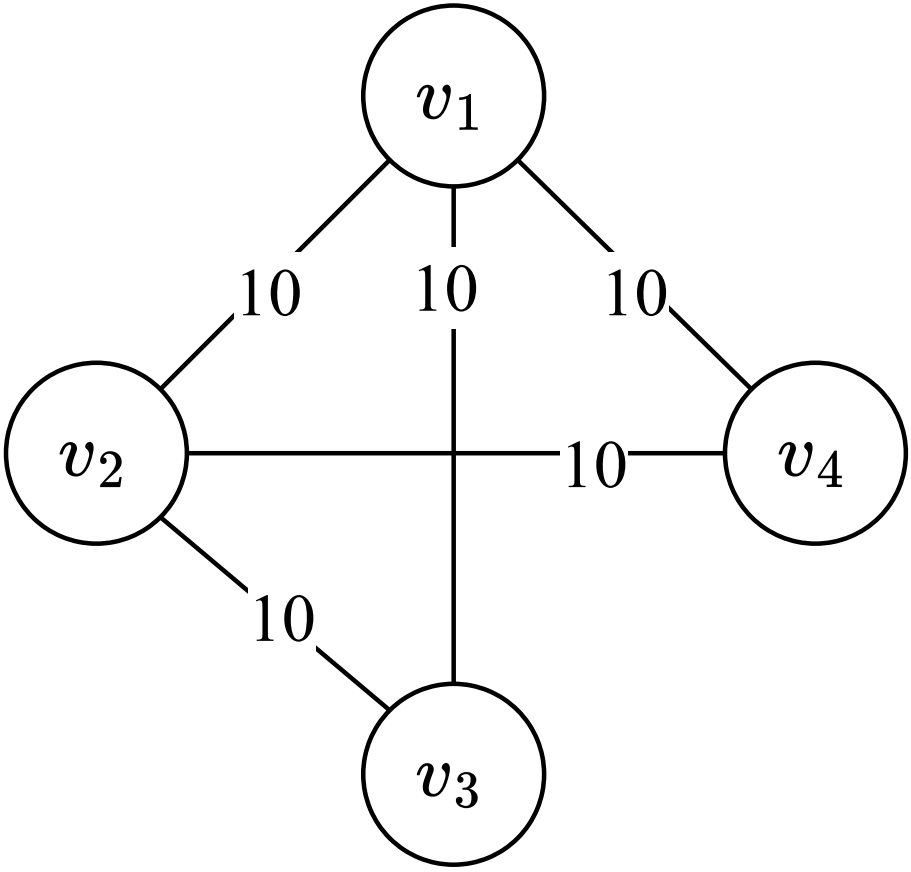
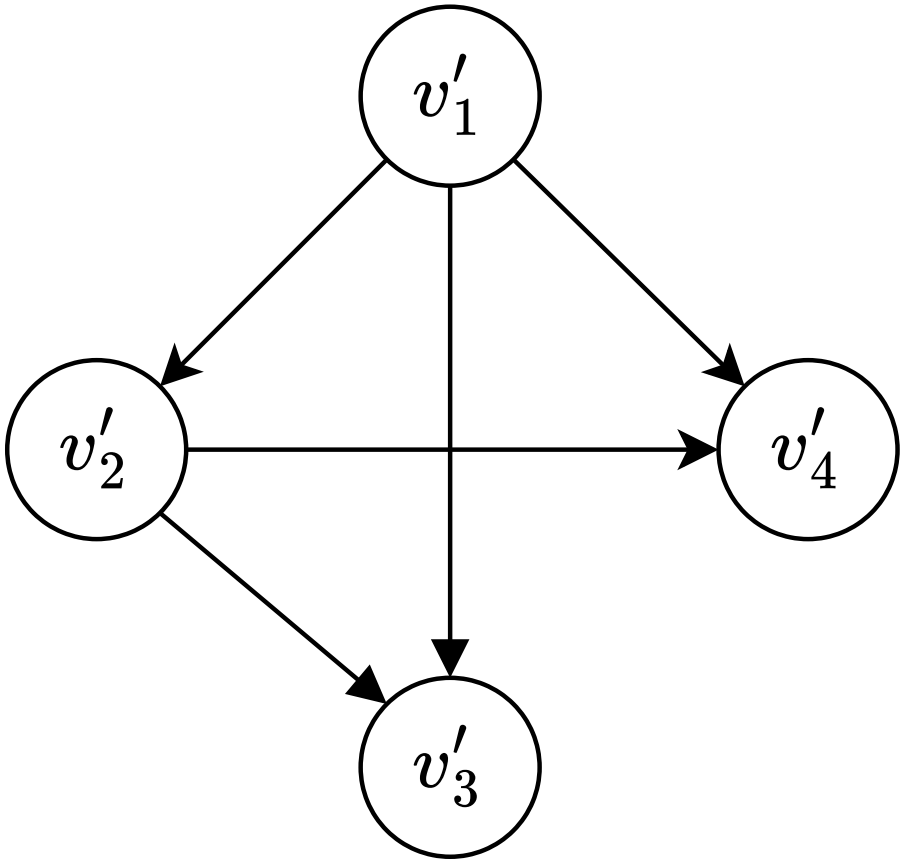
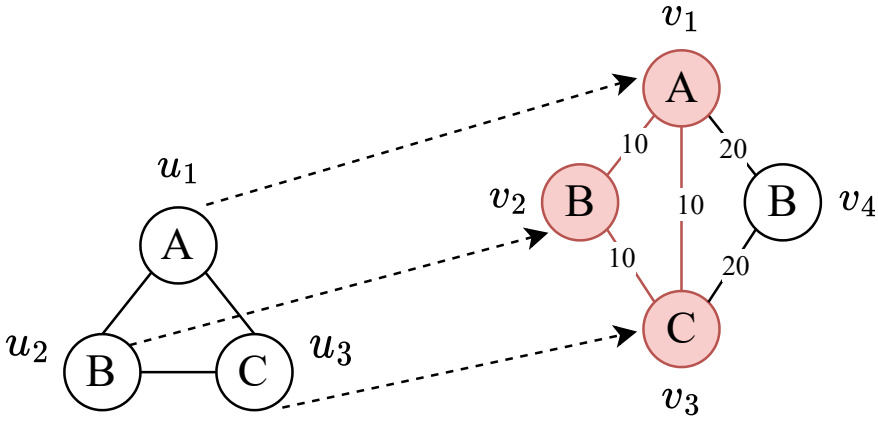
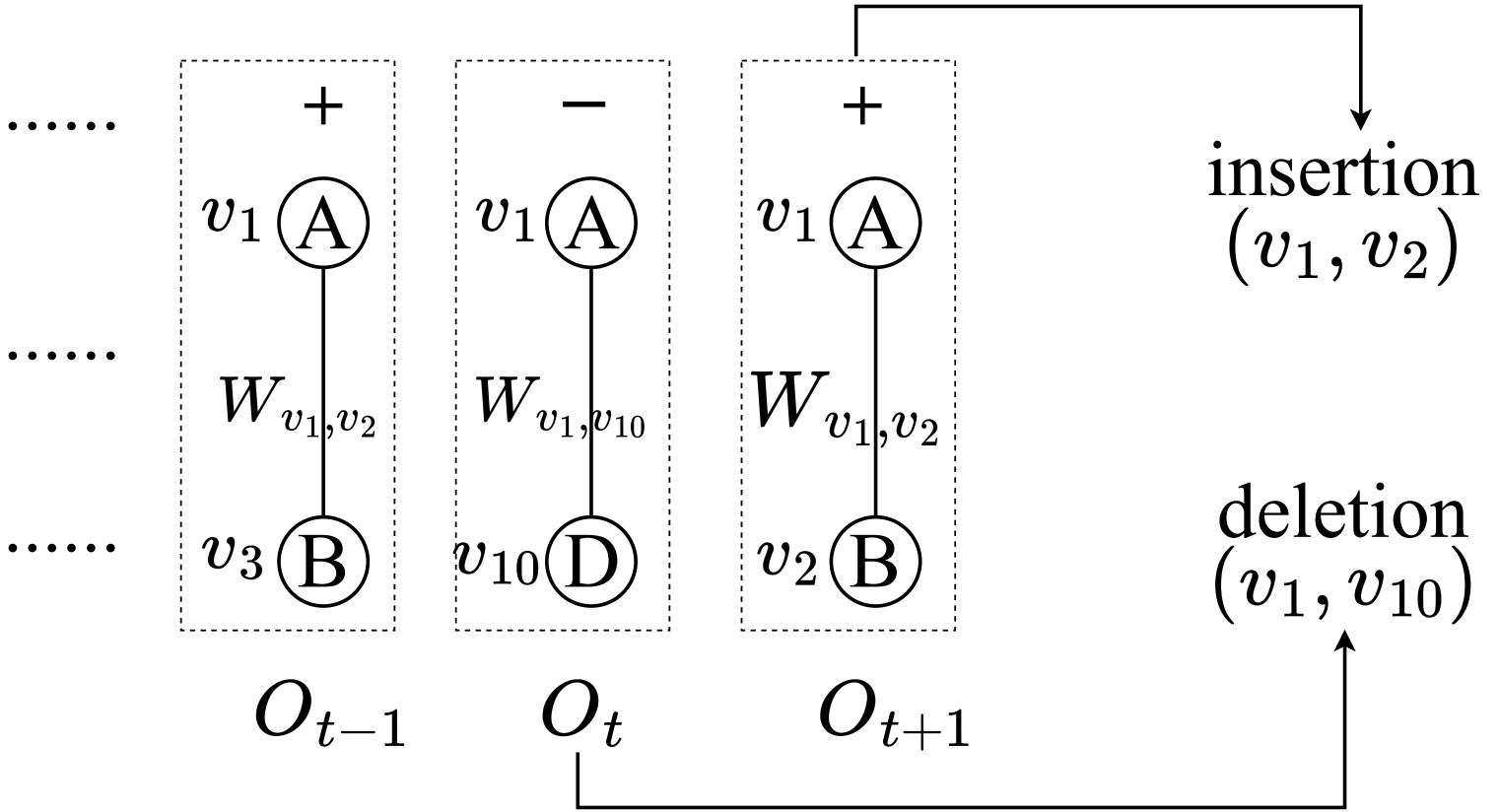
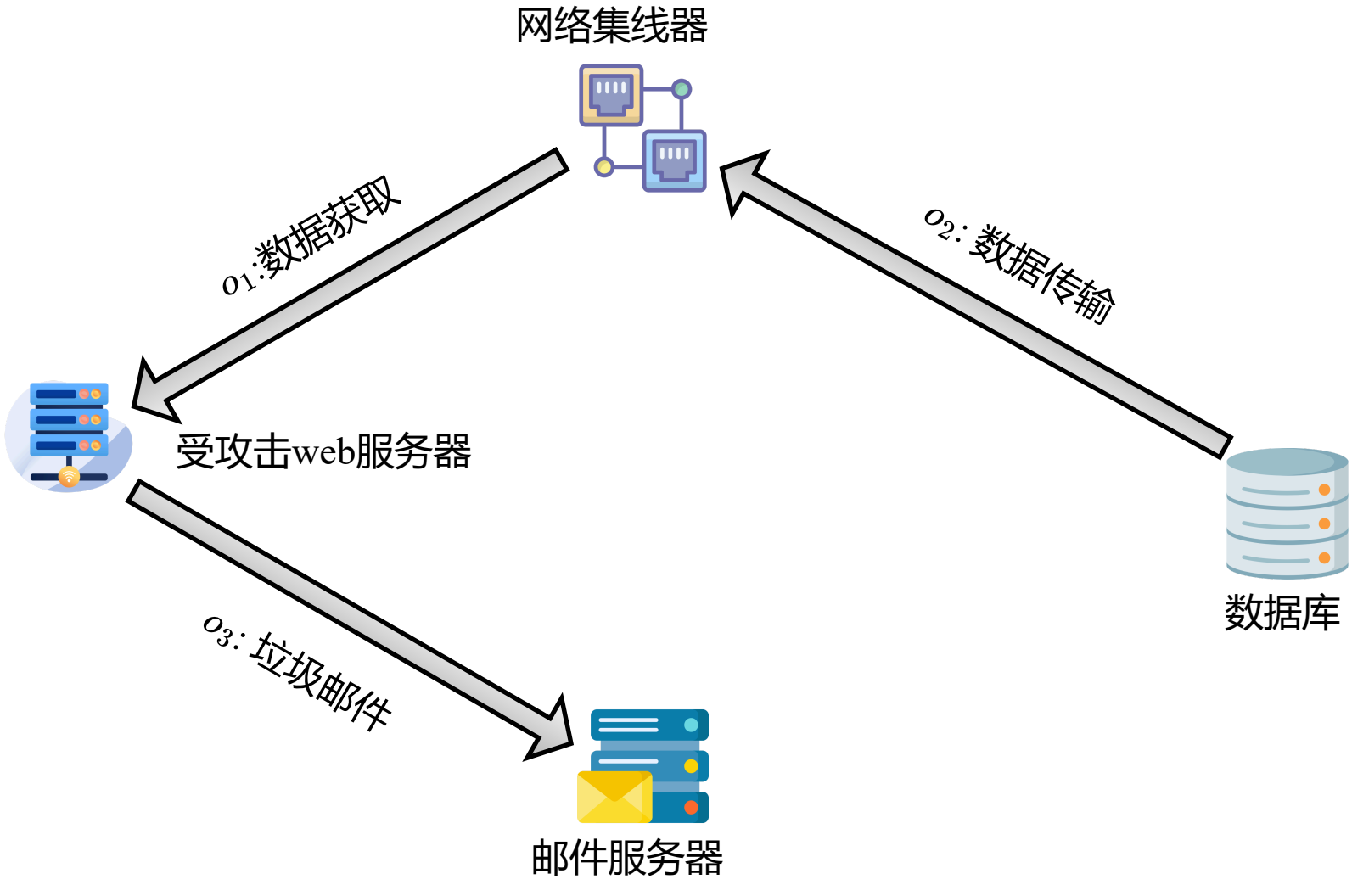
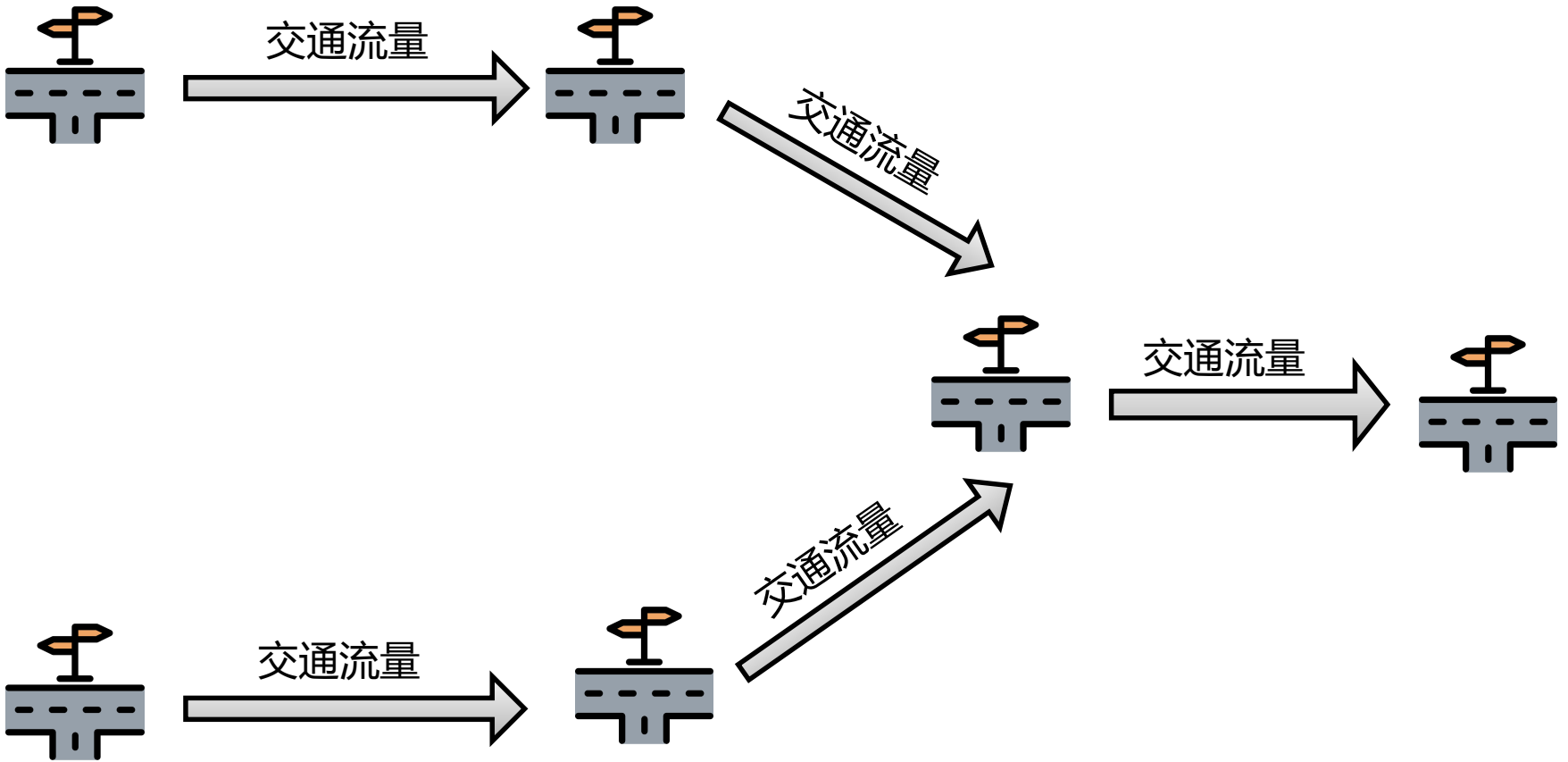

v_1
10
10
10
v_2
10
v_4
10
v_3


v'_1
v'_2
v'_4
v'_3

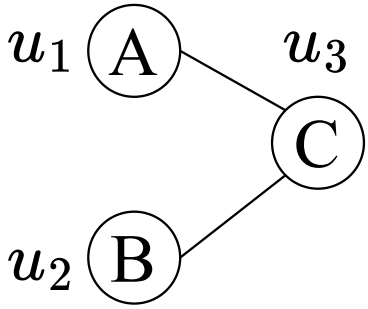

u_1
A
u_2
B
C
u_3
v_1
A
v_2
B
v_3
C
B
v_4
10
10
10
20
20


.....
.....
.....
+
−
+
v_1 A
v_1 A
v_1 A
W_{v_1,v_2}
$W_{v_1,v_{10}}$
W_{v_1,v_2}
v_3 B
v_{10} D
v_2 B
insertion
(v_1, v_2)
deletion
(v_1, v_{10})
O_{t-1}
O_t
O_{t+1}

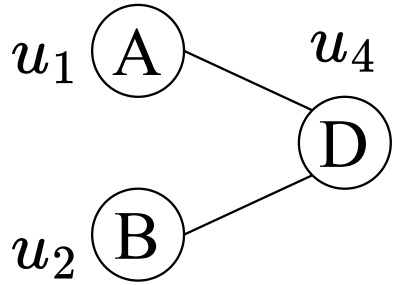

网络集线器
o_1:数据获取
o_2: 数据传输
受攻击web服务器
o_3: 垃圾邮件
数据库
邮件服务器


交通流量
交通流量
交通流量
交通流量
交通流量

$$\Phi : \{u_1, u_2, u_3, u_4\}$$

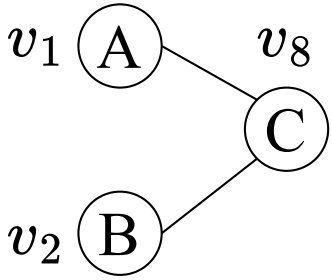


$Q_{star}(3)$

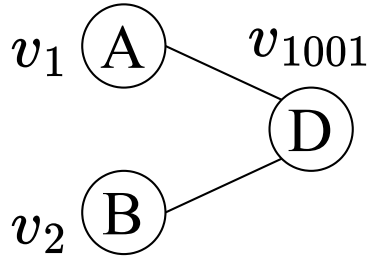


$Q_{star}(4)$

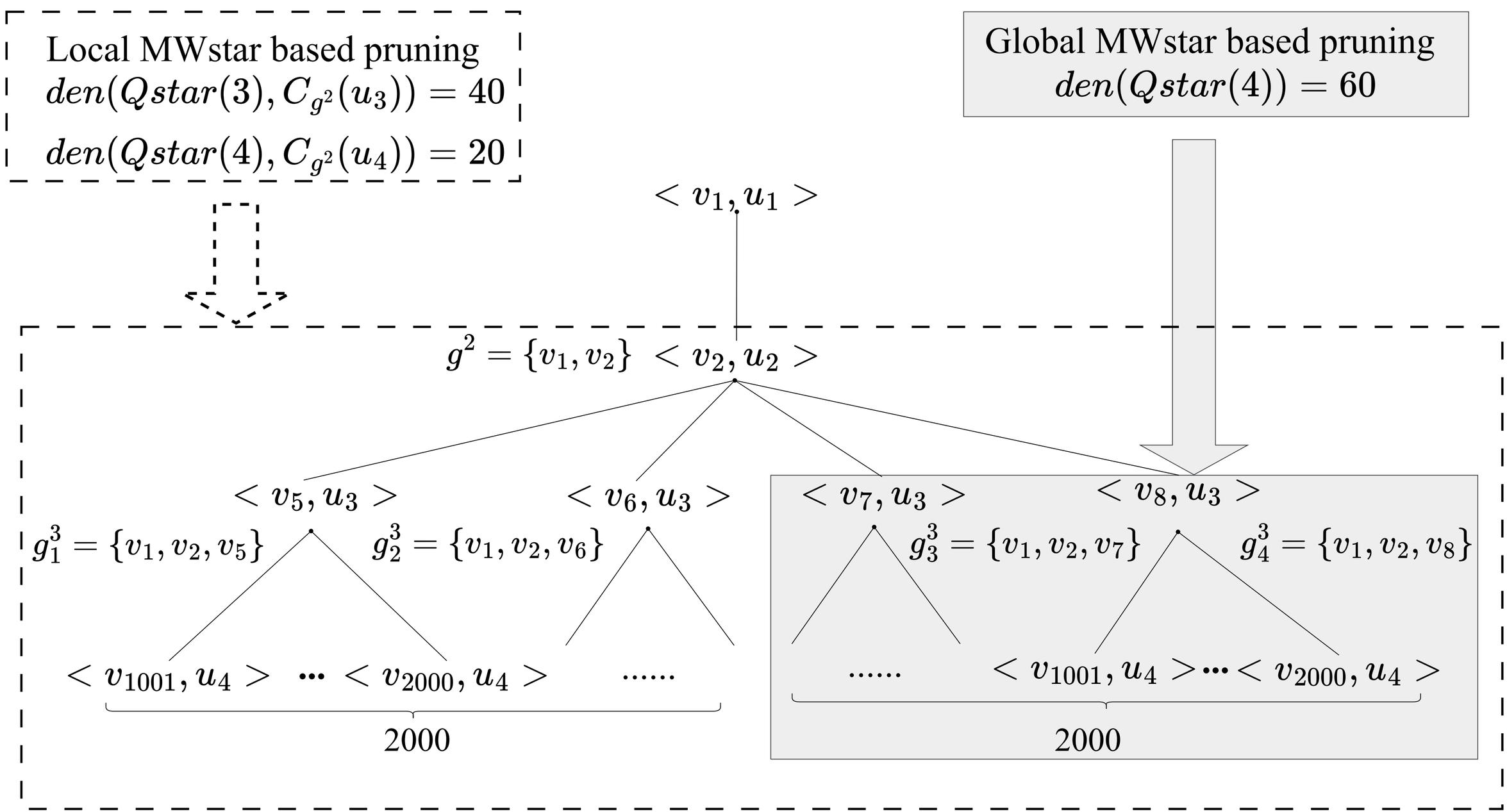
$$g : \{v_1, v_2, v_8, v_{1001}\}$$

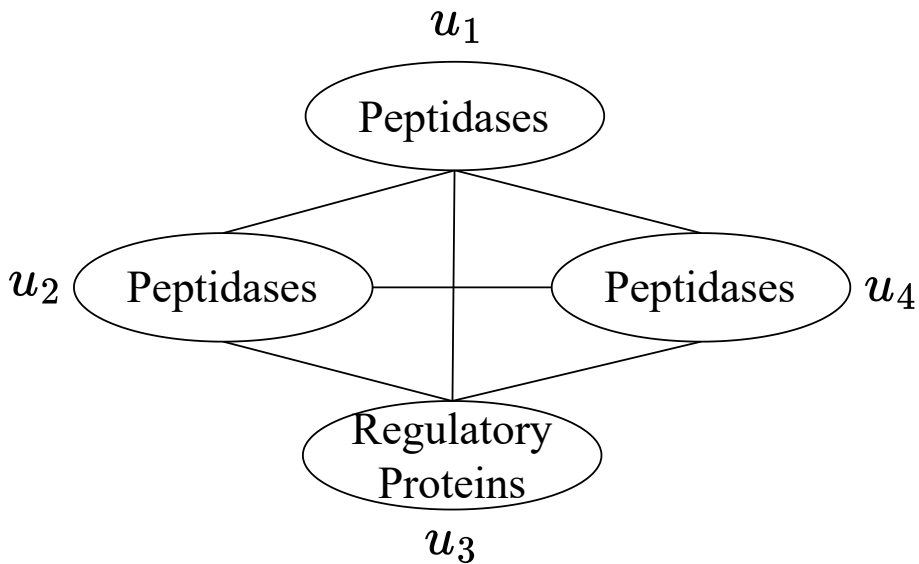


$D_{star}(g, 3)$



$D_{star}(g, 4)$


Local MWstar based pruning
$den(Qstar(3), C_{g^2}(u_3)) = 40$
$den(Qstar(4), C_{g^2}(u_4)) = 20$
Global MWstar based pruning
$den(Qstar(4)) = 60$
$< v_1, u_1 >$
$g^2 = \{v_1, v_2\}$ $< v_2, u_2 >$
$< v_5, u_3 >$
$< v_6, u_3 >$
$< v_7, u_3 >$
$< v_8, u_3 >$
$g_1^3 = \{v_1, v_2, v_5\}$
$g_2^3 = \{v_1, v_2, v_6\}$
$g_3^3 = \{v_1, v_2, v_7\}$
$g_4^3 = \{v_1, v_2, v_8\}$
$< v_{1001}, u_4 >$ ••• $< v_{2000}, u_4 >$
.....
.....
$< v_{1001}, u_4 >$ ••• $< v_{2000}, u_4 >$
2000
2000



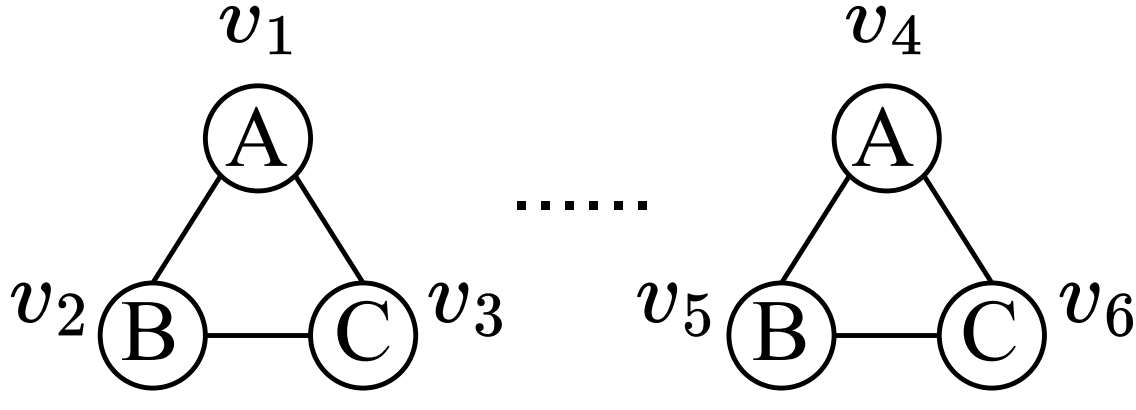
(a) 查询图 Q_1

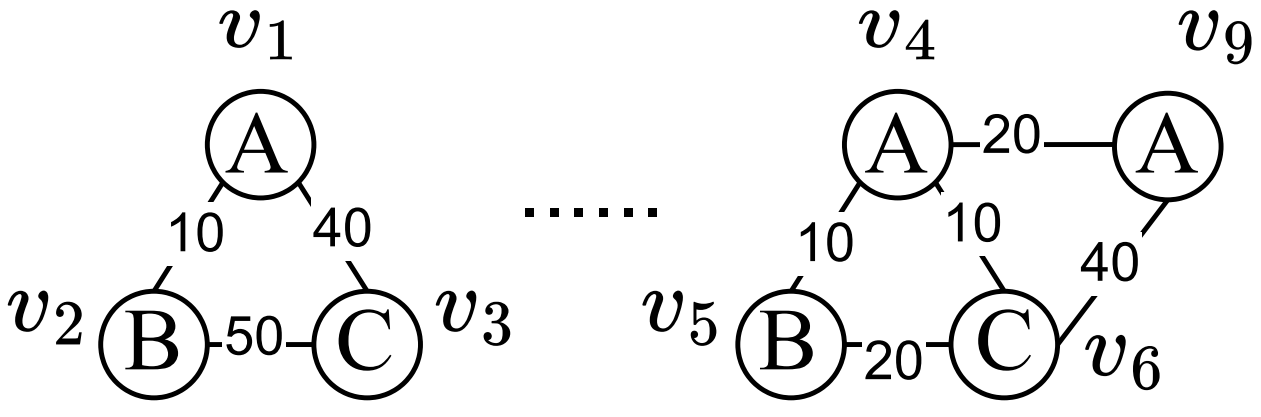
匹配序列: $\{u_1, u_2, u_3, u_4\}$

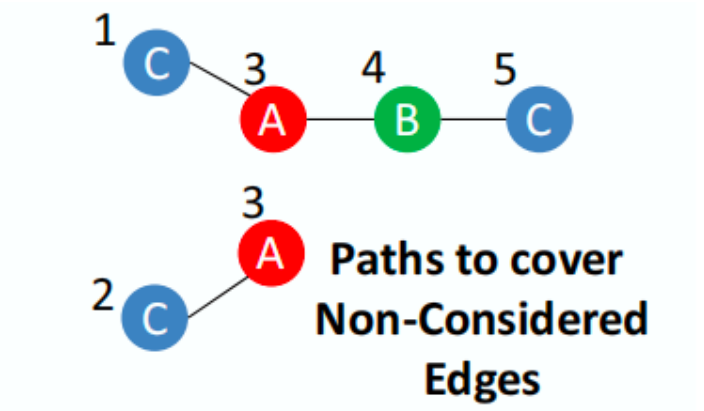
$g_0 : \langle SIRT1, EP300, p53, MDM2 \rangle$
$g_1 : \langle PIK3R1, PIK3CA, PTEN, PTK2 \rangle$
$g_2 : \langle CHEK1, CHEK2, ATR, CDC7 \rangle$

.....

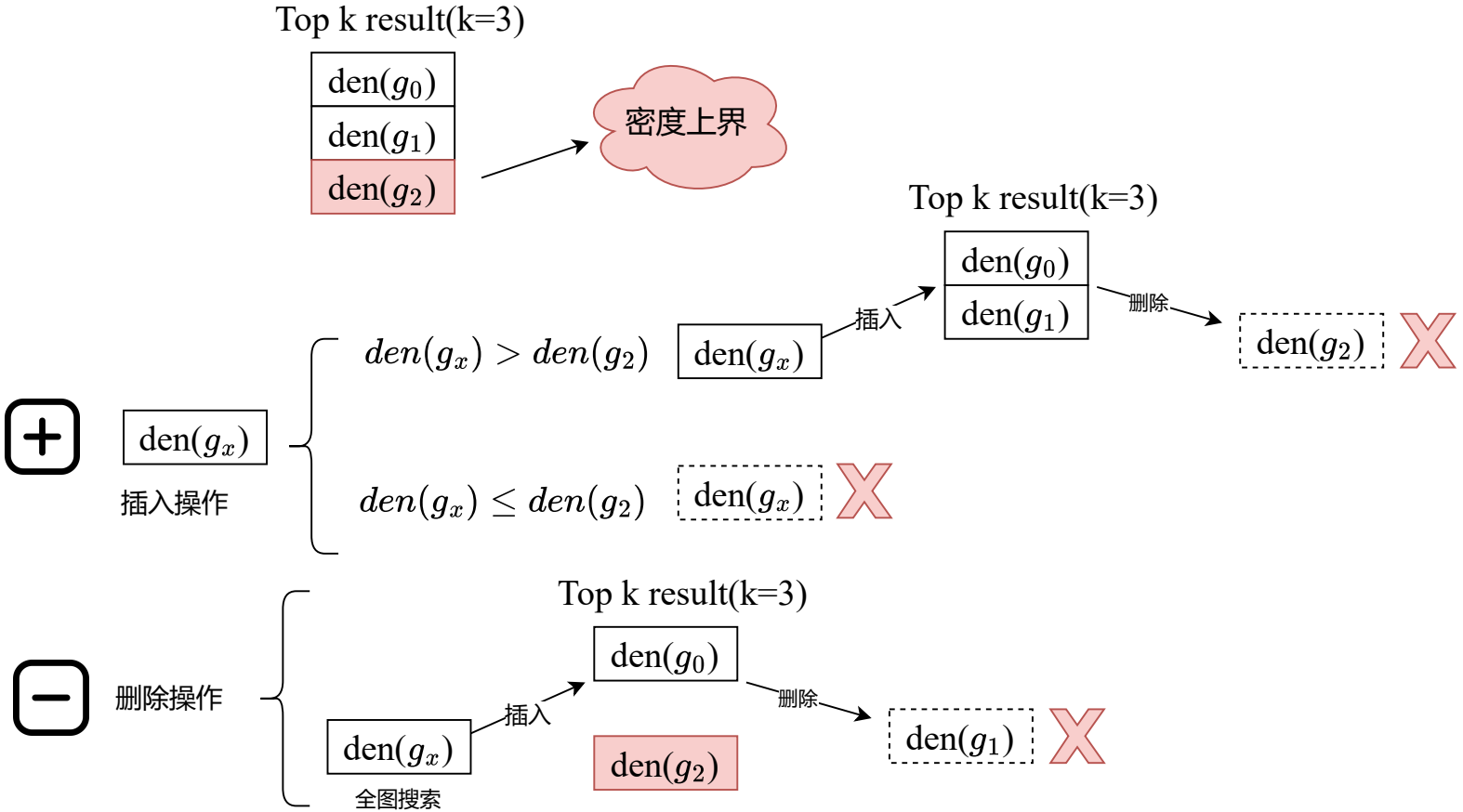
(b) 匹配答案

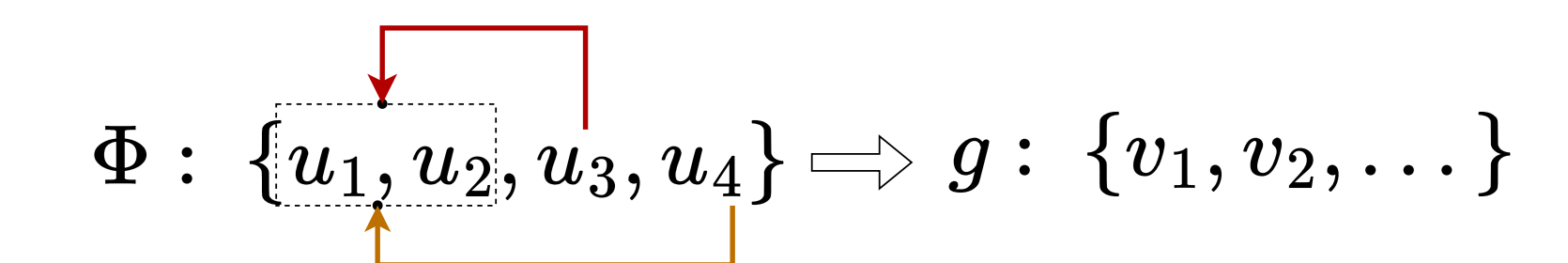

v_1
A
v_2
B
C
v_3
.....
v_4
A
v_5
B
C
v_6

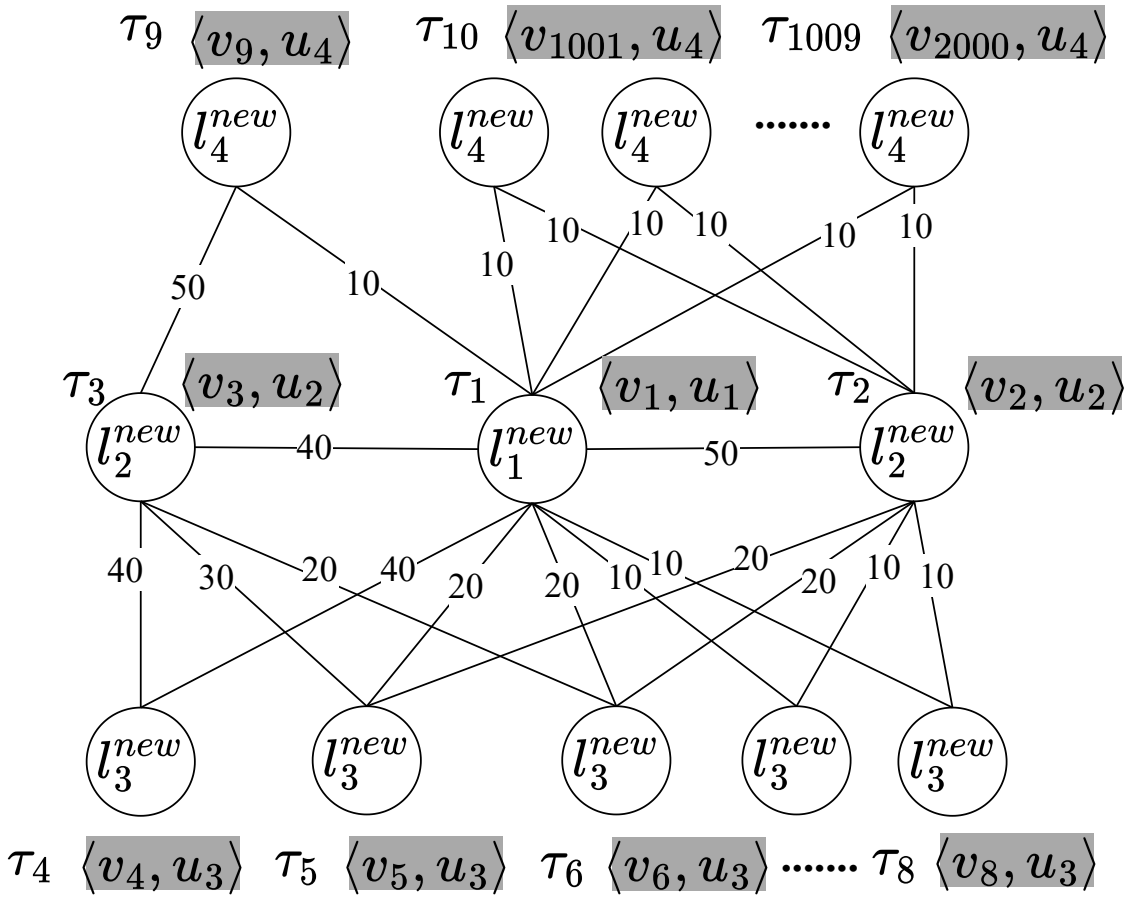

v_1
A
10
40
v_2
B
50
C
v_3
.....
v_4
v_9
A
20
A
10
10
40
v_5
B
20
C
v_6

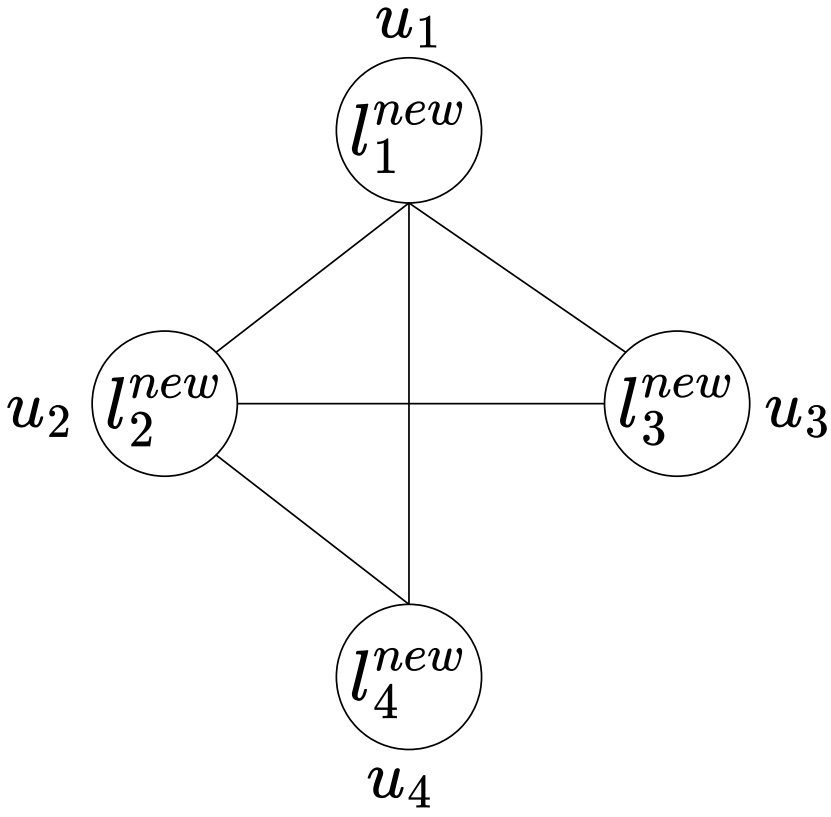


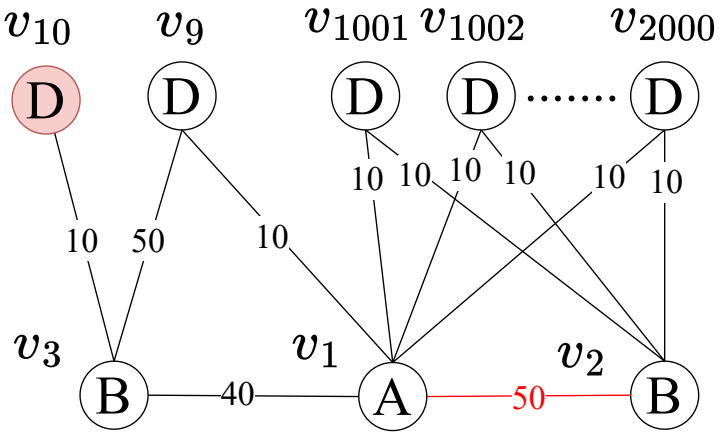
d→	1			2								
Node Id↓	A	B	C	AA	BA	CA	AB	BB	CB	AC	BC	CC
1	1		1	1			1		1	1		
2	1	2	1	1	2	1				2	1	1
3	2		2	1		2	2			2		2
4	2	1	1	2	2	1	1			2	1	1


Top k result(k=3)
den(g_0)
den(g_1)
den(g_2)
密度上界
Top k result(k=3)
den(g_0)
den(g_1)
插入
删除
den(g_2)
den(g_x)
插入操作
$den(g_x) > den(g_2)$
den(g_x)
$den(g_x) \leq den(g_2)$
den(g_x)
删除操作
Top k result(k=3)
den(g_0)
den(g_x)
插入
删除
den(g_1)
den(g_2)
全图搜索

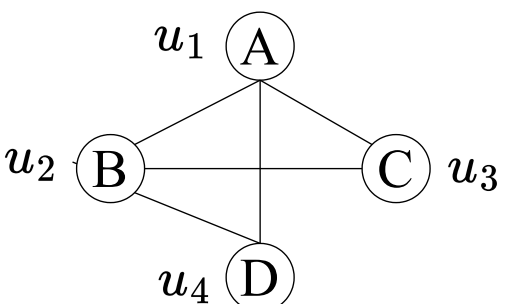

$\Phi: \{u_1, u_2, u_3, u_4\} \Longrightarrow g: \{v_1, v_2, \ldots\}$


τ_9 $\langle v_9, u_4 \rangle$
τ_{10} $\langle v_{1001}, u_4 \rangle$
τ_{1009} $\langle v_{2000}, u_4 \rangle$
l_4^{new}
.....
50
10
τ_3 $\langle v_3, u_2 \rangle$
τ_1 $\langle v_1, u_1 \rangle$
τ_2 $\langle v_2, u_2 \rangle$
l_2^{new}
l_1^{new}
40
50
40
30
20
40
20
20
10
10
20
20
10
10
l_3^{new}
τ_4 $\langle v_4, u_3 \rangle$
τ_5 $\langle v_5, u_3 \rangle$
τ_6 $\langle v_6, u_3 \rangle$
..... τ_8 $\langle v_8, u_3 \rangle$

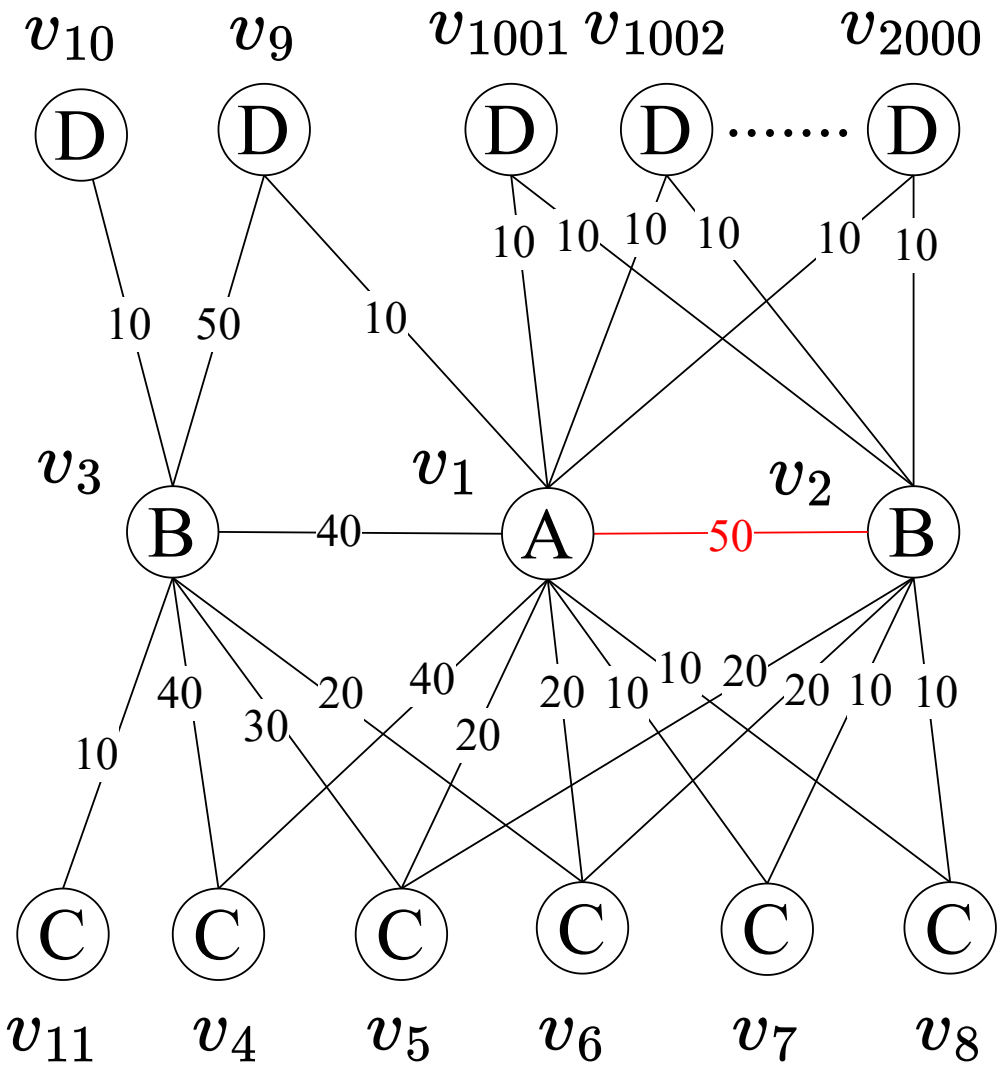

u_1
l_1^{new}
u_2
l_2^{new}
l_3^{new}
u_3
l_4^{new}
u_4



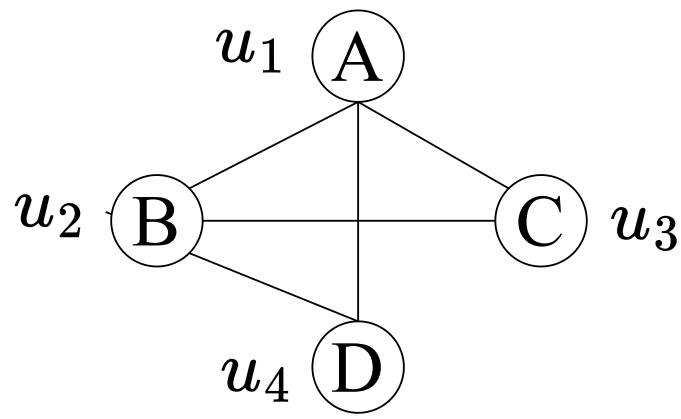
(c) 部分数据图



(b) 查询图 Q



(a) 数据图 G_t

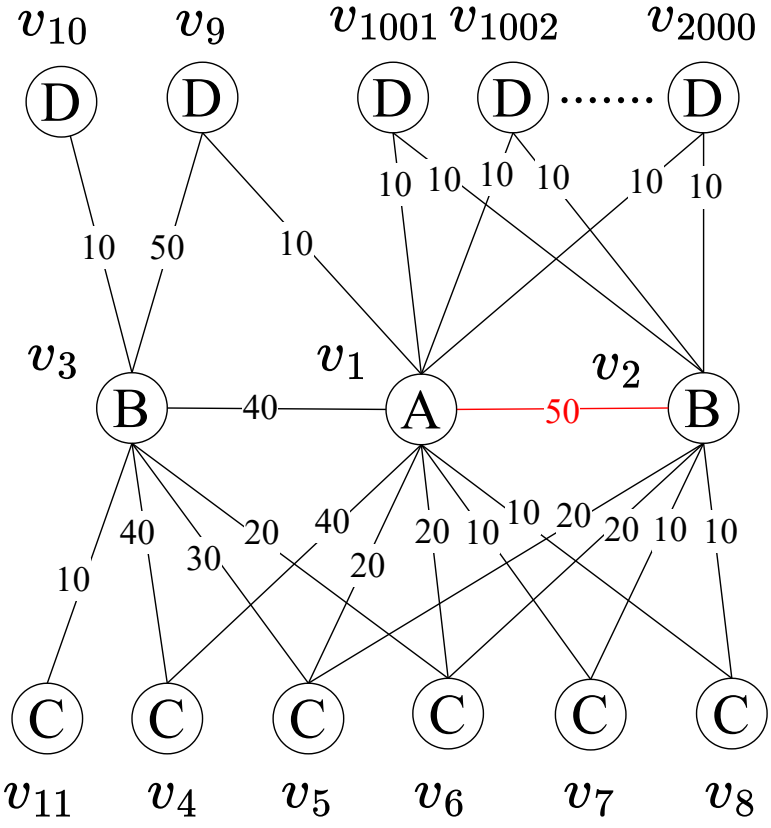


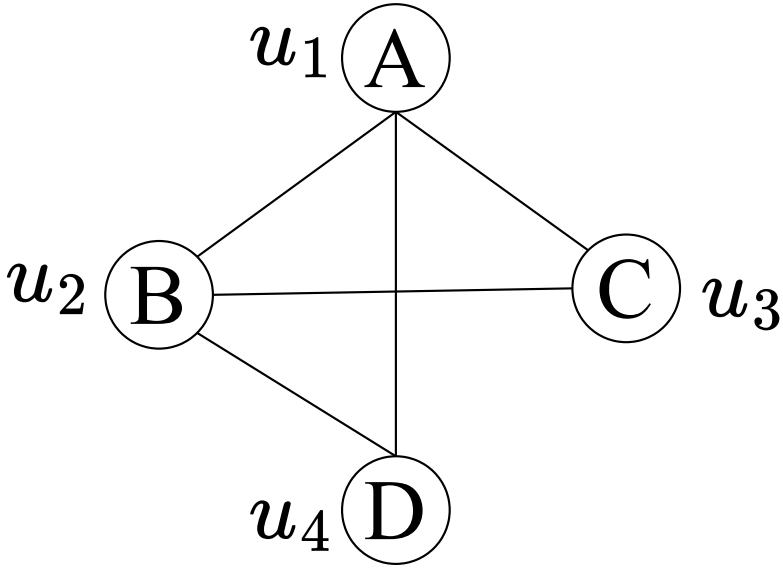
(b) 查询图 Q

匹配序列 $\{u_1, u_2, u_3, u_4\}$

$A_{G_t,Q}$	$f(u_1)$	$f(u_2)$	$f(u_3)$	$f(u_4)$	$den(\cdot)$
g_0	v_1	v_3	v_4	v_9	180
g_1	v_1	v_3	v_5	v_9	150
g_2	v_1	v_3	v_6	v_9	140

(c) 结果


v_{10}
v_9
v_{1001}
v_{1002}
v_{2000}
D
D
D
D
D
10
10
10
10
10
10
10
50
10
v_3
v_1
v_2
B
40
A
50
B
40
20
40
20
10
10
20
20
10
10
30
20
10
C
C
C
C
C
C
v_{11}
v_4
v_5
v_6
v_7
v_8



$$\Phi : \{u_1, u_2, u_3, u_4\}$$

$A_{G_t,Q}$	$f(u_1)$	$f(u_2)$	$f(u_3)$	$f(u_4)$	$den(\cdot)$
g_0	v_1	v_3	v_4	v_9	180
g_1	v_1	v_3	v_5	v_9	150
g_2	v_1	v_3	v_6	v_9	140