

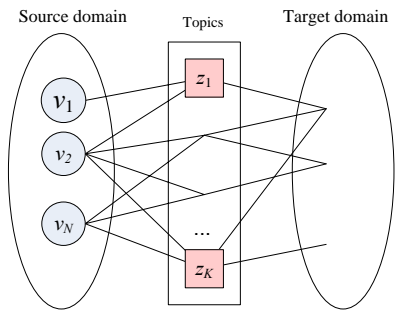
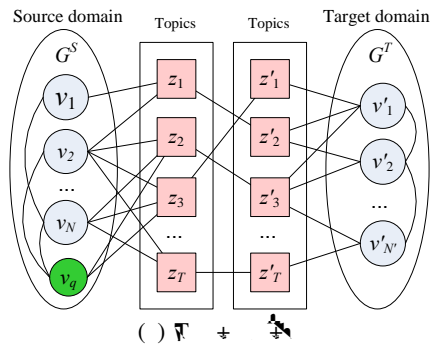
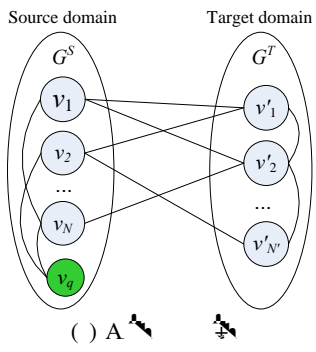
# Cross-domain Collaboration Recommendation

† a a †, u †, u †, a a u †  
† a † u a a h , h ua  
a h ua. u. , a a. , u. , t a . uaa. u.

## ABSTRACT

I + +  
+ . H w , f f + -  
+ - + ? H w f ? C w +  
+ f+ ? ff + -  
C - + x ff + -  
: 1) sparse  
connection: + - + ; 2) complemen-  
tary expertise: + - + ff x-  
; 3) topic skewness: + - +  
+ f+ f +. A  
f I , w f + +  
f + +  
C - F +L (CFL)  
+ + CFL + -  
f x + , w +  
F f + , CFL +  
f + , w



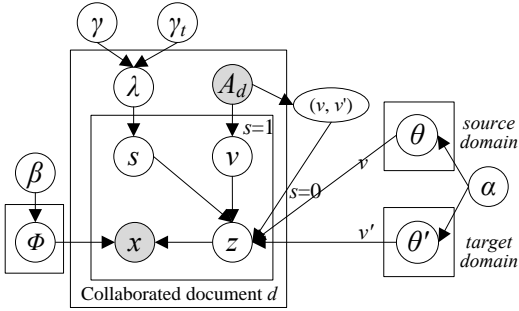


```

Input:  $G^S, G^T$ 
Output:  $\theta, \theta', \phi, \vartheta, \lambda$ 
Algorithm 1:
foreach  $c \in \{ab, dd, cm, d\}$  do
  foreach  $d \in \mathcal{D}$  do
     $z_{di} \sim \text{Dir}(\lambda, \mathbf{1})$ 
     $s \sim \text{Dir}(A_d, \mathbf{1})$ 
     $v \sim \text{Dir}(z_{di}, \mathbf{1})$ 
     $v' \sim \text{Dir}(z_{di}, \mathbf{1})$ 
     $x \sim \text{Dir}(\beta, \mathbf{1})$ 
     $\theta \sim \text{Dir}(\alpha, \mathbf{1})$ 
     $\theta' \sim \text{Dir}(\alpha', \mathbf{1})$ 
     $\gamma_t \sim \text{Dir}(\gamma, \mathbf{1})$ 
     $\gamma \sim \text{Dir}(\gamma_t, \mathbf{1})$ 
     $\phi \sim \text{Dir}(\beta, \mathbf{1})$ 
  end
end

```

**Algorithm 1:** CTL.



**Figure 3:** Graphical representation of CTL model.

$P(z|v)$   
 $E.1$

### 3.3 Cross-domain Topic Learning (CTL)

A  
 C  
 L

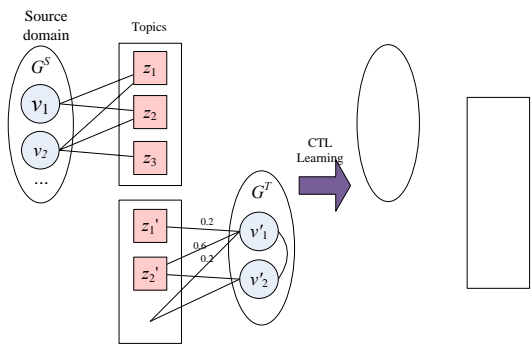
#### Model description.

$\beta$   
 $\alpha$   
 $\alpha'$   
 $\gamma$   
 $\gamma_t$   
 $\phi$   
 $\lambda$   
 $A_d$   
 $s$   
 $v$   
 $v'$   
 $x$   
 $z$   
 $\theta$   
 $\theta'$

**Table 1: Notations in the CTL model.**

MB	L	DE	C	I	$\bar{I}$
$T$			$f$		$+$
$d$		$+$			$+$
$A_d$			$f$		$d$
$d_i$			$(w)$		$d$
$d_i$					$d_i$
$d_i$		$f$	$d_i$	$w$	$f$
$\theta_v$					$+$ $+$ $+$
$\vartheta_{vv'}$					$+$ $+$ $+$
$\phi_z$				$w$	$+$ $+$ $+$
$\alpha, \beta$	D				$\theta, \theta'$ $\phi$
$\lambda$			$f$		
$\gamma, \gamma_t$	B				$\lambda$

CTL  
 CTL  
 L  
 $d; v$   
 $(v, v')$   
 $(s=1)$   
 $(s=0)$   
 $(v, v')$   
 CTL  
 F  
 CTL  
 $p(s|d) \sim \text{beta}(t, \dots)$   
 $\text{beta}(\dots)$   
 $s=1,$   
 $s=0,$   
 $(v, v')$   
 $v = \langle v, 0, \dots, 0 \rangle$   
 $v' = \langle 0, \dots, 0, v' \rangle$   
 CTL  
 B  
 CTL



1,932,442  
f 1990 2005.

- **Data Mining:**  
KDD, DM, ICDM, DM KDD  
6,282  
22,862

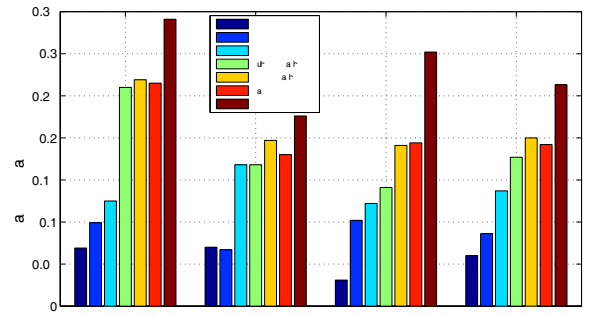
- **Medical Informatics:**  
J A M I f A  
J B I f A I  
M , IEEE M I IEEE  
I f B , f  
w w f 9,150 31,851

- **Theory:**  
F C DA, f w w 5,449  
27,712

- **Visualization:**

**Table 2: Recommendation performance by different methods on the four cross-domain test cases (%). Content– Content Similarity; CF– Collaborative Filtering; Author– Author Matching; Topic– Topic Matching.**

Cross domain	ALG	P@10	P@20	MAP	R@100	ARHR -10	ARHR -20
D M ( )	C	10.3	10.2	10.9	31.4	4.9	2.1
	CF	15.6	13.3	23.1	26.2	4.9	2.8
	H	17.4	19.1	20.0	29.5	5.0	2.4
	A	27.2	22.3	25.7	32.4	10.1	6.4
	F	28.0	26.0	32.4	33.5	13.4	7.1
	K	30.4	29.8	31.6	27.4	11.2	5.9
	CFL	<b>37.7</b>	<b>36.4</b>	<b>40.6</b>	<b>35.6</b>	<b>14.3</b>	<b>7.5</b>
M + I f . ( )	C	10.1	10.9	12.5	45.9	3.6	2.1
	CF	18.3	20.2	21.4	47.6	5.3	3.9
	H	25.0	26.5	28.4	59.1	6.4	4.2
	A	26.2	29.6	32.2	54.8	10.5	<b>5.4</b>
	F	29.4	26.3	34.7	59.3	<b>11.5</b>	5.2
	K	27.5	28.3	30.7	57.2	10.5	5.0
	CFL	<b>32.5</b>	<b>30.0</b>	<b>36.9</b>	<b>59.8</b>	11.4	<b>5.4</b>
D M (F)	C	5.8	5.7	9.5	19.8	1.9	0.9
	CF	13.7	17.8	18.9	34.3	2.7	1.3
	H	18.0	19.0	19.8	36.7	3.4	1.3
	A	20.1	23.8	29.3	<b>64.4</b>	5.3	2.1
	F	26.0	<b>25.0</b>	33.9	48.1	10.7	5.6
	K	21.2	23.8	32.4	48.1	10.2	4.8
	CFL	<b>30.0</b>	24.0	<b>35.6</b>	49.6	<b>12.2</b>	<b>6.0</b>
D M ( )	C	9.6	11.8	13.2	18.9	3.1	1.8
	CF	14.0	20.8	26.4	29.4	6.9	4.3
	H	16.0	20.0	27.6	30.1	6.3	4.4
	A	22.0	25.2	27.7	31.1	11.9	6.7
	F	26.3	25.0	32.3	31.4	13.2	8.8
	K	23.0	25.1	29.3	30.2	10.4	5.4
	CFL	<b>28.3</b>	<b>26.0</b>	<b>32.8</b>	<b>36.3</b>	<b>14.0</b>	<b>9.1</b>



**Figure 6: Performance on new collaboration prediction of all algorithms.**

Hyperparameter analysis.

Restart parameter analysis.

Convergence analysis.

New Collaboration Prediction

**4.3 Prototype System**

1,932,442

(Cf. 3.3)

**5. RELATED WORK**

7

17





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## 8. APPENDIX

A++ (B ) , w + .