Publication Venue Recommendation based on Paper Abstract

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MACHINE LEARNING LAB

The Problem

- Given a scientific **paper** *p*
- Recommend an ordered list of “suitable” **publication venues** $v_1, v_2, \ldots, v_N$

Motivation

- Everyone knows “the” top-level conferences
- Choosing the right venue for early / exploratory work is not easy
- More than 2000 CS conferences
  - Broad spectrum between generalist vs specific
  - How to have high precision and recall ?
- Some emerging proposals
- ...and to be frank: a nice and challenging problem...

Novelty and Advantages

- Recommendation based solely on **title** and **abstract**
- Unlike earlier proposals based on **full-text** and **reference list**

- May be used **earlier** in the authoring process
- KB much **simpler** to build and maintain

Our work in a nutshell

- Three approaches
- Assessed on 58000 papers / 300 conferences from Microsoft Academic Search

- Results aligned with existing state of the art
- ...but with much less info from paper and KB !

Approach 1: Cavnar-Trenkle

Assumption:

- Each venue has a specific **language profile**
  - Profile: n-gram list sorted by frequency ($n \leq 5$)

Recommend:

- Venues with language profiles “closest” to the examined paper

LDA in a nutshell (I)

INPUT

- Collection of papers
- Predefined #topics

OUTPUT

- Each **topic** is a **mix of words**:
  word vector (prob. of finding that word in “this” topic)
- ...

Example topics

Topic	4 most probable words			
1	data	analysi	mobil	network
2	system	network	mobil	comput
3	system	process	analysi	comput
4	network	sensor	wireless	system
5	network	data	algorithm	perform
6	comput	network	servic	perform

- A topic "**is**" just a word probability vector
- Topics are discovered (generated) **automatically**
- We arbitrarily set #topics=20

LDA in a nutshell (II)

INPUT

- Collection of papers
- Predefined #topics

OUTPUT

- Each **topic** is a **mix of words**:
  word vector (element *k* = prob. of being found in topic *k*)
- Each **paper** is a **mix of topics**
  topic vector (element *k* = prob. of being related to topic *k*)

Approach 2: 2-Step LDA

Assumption:

- Each venue has a **prevalent topic**
  - The one most probable for most papers
- **Sub**-topics are the topics generated with LDA **restricted** to venues with **the same prevalent topic**

Recommend:

- Venues with prevalent topic and sub-topics “closest” to the examined paper

Approach 3: LDA+Clustering

Assumption:

- Papers may be **clustered** based on their topic mix
- **Sub**-topics are the topics generated with LDA **restricted** to papers from **the same** ~~prevalent topic~~ **cluster**

Recommend:

- Venues with subtopic mix “closest” to the examined paper

Experimental Evaluation

- 58000 papers / 300 conferences
  from Microsoft Academic Search

- Half training (Knowledge Base)
- Half testing (Recommend)
  - “Half” = same #papers in each conference

- Two repetitions (with different splitting)

Metric

- Venue-Accuracy@N
  - Prediction is correct when:
    real venue is in the N recommended venues

- Probably excessively (and unnecessarily) severe
  - A paper may fit many conferences

Baseline

- Random recommender

- Earlier proposals: not really meaningful
  - Very different datasets
    (size, content)
  - Keep in mind: they need **full text** and **reference list**

Venue-Accuracy@N

Method	venue-acc.@N (%) $N=3$	$N=5$	$N=10$	Dataset $\|A\|$	$\|V\|$
Cavnar-Trenkle	26.8	34.0	45.6		
				58466	300
Random recommender	1.0	1.7	3.3		
[2] ACM					
[2] CiteSeer					
[3]					
[4]					

- Simple n-gram profile is indeed effective

Venue-Accuracy@N

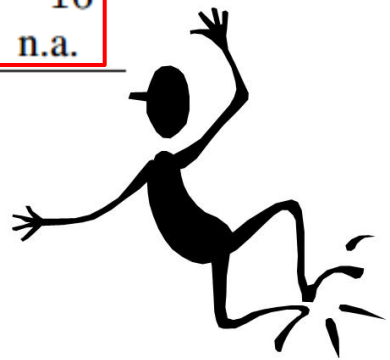
Method	venue-acc.@N (%) $N=3$	$N=5$	$N=10$	Dataset $\|A\|$	$\|V\|$
Cavnar-Trenkle	26.8	34.0	45.6	58466	300
Two-step-LDA	3.4	3.8	4.0		
LDA+clustering	16.1	21.7	33.2		
Random recommender	1.0	1.7	3.3		
[2] ACM					
[2] CiteSeer					
[3]					
[4]					

- Topic models may *(or may not)* be effective
- Many matching criteria

Earlier proposals

Method	venue-acc.@N (%) $N=3$	$N=5$	$N=10$	Dataset $\|A\|$	$\|V\|$
Cavnar-Trenkle	26.8	34.0	45.6	58466	300
Two-step-LDA	3.4	3.8	4.0		
LDA+clustering	16.1	21.7	33.2		
Random recommender	1.0	1.7	3.3		
[2] ACM	-	55.7	69.8	172 890	2197
[2] CiteSeer	-	23.9	29.0	35 020	739
[3]	91.6	-	-	960	16
[4]	-	-	63.2	295 317	n.a.

- Relying on **only title and abstract** seem to be enough !



A Weaker Metric

- **Subdomain-**Accuracy@N
  - Each venue has one or more of 24 subdomains (assigned by Microsoft Academic Search)
  - Prediction is correct when:

    subdomains of real venue and of N recommended venues have non-empty intersection

Subdomain-Accuracy@N

Method	sub-domain-acc.@N (%) $N=3$	$N=5$	$N=10$
Cavnar-Trenkle	54.1	61.1	70.9
Two-step-LDA	9.9	10.1	10.2
LDA+clustering	47.3	56.5	68.9
Random recommender	14.3	22.6	40.1

- “Similar” conclusions

Thanks for your attention

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