Outline

Measuring Article Quality in Wikipedia: Models and Evaluation Meiqun Hu, Ee-Peng Lim, Aixin Sun, Hady W. Lauw, Ba-Quy Voung

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ACM CIKM 2007, Lisboa, Portugal

1 Introduction

- Quality Measurement Models
 - Basic
 - PeerReview
 - ProbReview



4 Related Work *

5 Conclusion

Road Map

1 Introduction

- 2 Quality Measurement Models
 - Basic
 - PeerReview
 - ProbReview
- 3 Experimental Results
- 4 Related Work *

5 Conclusion

Introduction to Wikipedia

WikipediA



Wikipedia Web 2.0 service, aim for collaboration and interaction. Launched on January 15, 2001.

Written collaboratively by volunteers.

Has 236 language editions.

Contains over 2 million articles in English Edition alone, as of September 9, 2007.

Top ten most-visited website worldwide.

Criticism on Reliability in Wikipedia Articles

Open & Free Anyone can edit and create articles Anyone can over-write content contributed by other people Criticism: Information Accuracy Reputability of Third-party Sources Editorial and Systemic Bias Vandalism Uneven Quality

Communities in Wikipedia

WikiProject Anti–vandalism bot Quality patrolling

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Challenges in Quality Assessment in Wikipedia

- Large number of articles.
- Wide range of subject topics.
- Evolving content in the articles.
- Varying contributor background.
- Abuses.

Research Objective

To develop quality measurement models for collaboratively edited articles in Wikipedia with minimum human interpretation on article content.

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5 Conclusion

An Example of Two Articles

A Short Article of Start-status Kings Canvon National Park





History



A Long Article of Featured-status Yellowstone National Park

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Early history







spliting up with the other trappens in 1907, Coller passed through a postion of what later became the park, during the writer of 1907-1908.



Meigun Hu

Measuring Article Quality in Wikipedia: Models and Evaluation

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History



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An Example of Two Articles

A Short Article of Start-status Kings Canvon National Park



Geography



History



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Image: A matrix

Naïve model

Naïve

The more words the articles have, the better the quality.

Drawback Not reliable Easily be foole

Naïve model

Naïve

The more words the articles have, the better the quality.

Drawback Not reliable Easily be fooled

Article-Contributor Interaction



Basic model

Mutual Dependency between Quality and Authority

Good authors write good articles; Good articles are written by good authors.

Basic

$$Q_i = \sum_j c_{ij} \times A_j \tag{1}$$

$$A_j = \sum_i c_{ij} \times Q_i \tag{2}$$

Revision Evolution and Effect of Reviewers

In collaborative editing, contributors will, in general,

- read the article
- examine on the various parts of the article
- edit based on existing revision of the article

Assumption

 If content from earlier revision remains in current revision, then we say the editor of the current revision is a reviewer of the unchanged content; and arrees with the unchanged content.

• If some content of the article has been reviewed by high authority reviewers, then the content also carries high quality.

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PeerReview model

PeerReview

$$q_{ik} = \sum_{\substack{w_{ik} \stackrel{A}{\leftarrow} u_j \lor w_{ik} \stackrel{R}{\leftarrow} u_j \\ w_{ik} \stackrel{A}{\leftarrow} u_j \lor w_{ik} \stackrel{R}{\leftarrow} u_j}} A_j$$
(3)
$$A_j = \sum_{\substack{w_{ik} \stackrel{A}{\leftarrow} u_j \lor w_{ik} \stackrel{R}{\leftarrow} u_j}} q_{ik}$$
(4)

and,

.

$$Q_i = \sum_{w_{ik} \in a_i} q_{ik}$$

- Authority of the reviewers are as important as that of the author;
- Authority of the contributors aggregate the quality of both authored and reviewed words.

Alternative Assumption on the Review Behavior

In collaborative editing, contributors will, structureprobably,

- read the article
- examine on the various parts of the article
- edit based on existing revision of the article

However, changes like:

- Fill up missing statistics
- Add a template
- Minor edit

Observation on Incomplete Endorsement

- If content from earlier revision remains in current revision, we say the reviewer probably has reviewed the unchanged content.
- Words that are closer to the changes being made, are more likely being reviewed.

Alternative Assumption on the Review Behavior

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- Words that are closer to the changes being made, are more likely being reviewed.

ProbReview model

ProbReview

$$q_{ik} = \sum_{j} f(w_{ik}, u_j) A_j \tag{5}$$

$$A_j = \sum_{i,k} f(w_{ik}, u_j) q_{ik} \tag{6}$$

where,

$$f(w_{ik}, u_j) = \begin{cases} 1 & \text{if } w_{ik} \stackrel{A}{\leftarrow} u_j \\ Prob(w_{ik} \stackrel{R}{\leftarrow} u_j) & \text{otherwise} \end{cases}$$

and,

.

$$Q_i = \sum_{w_{ik} \in a_i} q_{ik}$$

э

Approximating Review Probability



- Review probability should remain high for some distance from the edited part.
- Non–zero tails.
- Rate probability delay.

Summary on Models

	Amount of Contribution	Authority of Authors	Authority of Reviewers	Partial Reviewership
Naïve	¢.			
Basic				
PeerReview				
ProbReview				

Summary on Models

	Amount of Contribution	Authority of Authors	Authority of Reviewers	Partial Reviewership
Naïve	¢			
Basic	¢	¢		
PeerReview	¢	¢	¢	
ProbReview	¢	¢	¢	¢

Road Map

Introduction

- Quality Measurement Models
 - Basic
 - PeerReview
 - ProbReview

3 Experimental Results

4 Related Work *

5 Conclusion

Article Set

WikiProject:Countries

Quality Assessment Scale

$\mathsf{Featured} \ \mathsf{Article} \preceq \mathsf{A} \preceq \mathsf{Good} \ \mathsf{Article} \preceq \mathsf{B} \preceq \mathsf{Start} \preceq \mathsf{Stub}$

Quality Class Distribution in WikiProject:Countries

Article Set

WikiProject:Countries

Quality Assessment Scale

 $\mathsf{Featured} \ \mathsf{Article} \preceq \mathsf{A} \preceq \mathsf{Good} \ \mathsf{Article} \preceq \mathsf{B} \preceq \mathsf{Start} \preceq \mathsf{Stub}$

Quality Class Distribution in WikiProject:Countries

Class	FA	A	GA	В	Start	Stub	Subtotal	Total
# articles	14	20	11	155	30	0	230	242
%	5.8	8.3	4.5	64.0	12.4	-	95.0	100.0
s(p)	4	3	2	1	0	_	_	-

Dataset Statistics

Pre-processing on revision history to extract interaction data between articles and their contributors.

nteraction Statistics from Data Processing							
nt	min	max	avg	std dev			
r article	60	1058	227.6	138.3			
r author	1	194	1.7	4.8			
r article	945	11,979	3,881.1	2,053.6			
r author	1	11,435	28.2	150.6			
r contribution	1	3,862	17.0	73.4			
r reviewer	0	834,572	2,437.4	10,200.2			
r article	90	2,087	406.1	271.2			
r reviewer	0	234	2.9	9.3			
	er article er author er article er author er contribution er reviewer er article er article er reviewer	cs from Data Processionatminer article60er author1er article945er author1er contribution1er reviewer0er article90er reviewer0er reviewer0	Intminmaxer article601058er author1194er article94511,979er author111,435er contribution13,862er reviewer0834,572er article902,087er reviewer0234	min max avg ar article 60 1058 227.6 ar author 1 194 1.7 ar author 1 194 1.7 ar author 1 194 28.2 ar author 1 11,435 28.2 ar contribution 1 3,862 17.0 ar reviewer 0 834,572 2,437.4 ar article 90 2,087 406.1 ar reviewer 0 234 2.9			

Evaluation Metric

Normalized Discounted Cumulative Gain at top \boldsymbol{k}

NDCG@k

$$NDCG = \frac{1}{Z}\sum_{p=1}^k \frac{2^{s(p)}-1}{\log\left(1+p\right)}$$

The normalization factor, Z, is determined such that a perfect ranking of top k articles will yield a NDCG of 1. That is,





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Results – NDCG on Article Ranking



Results – NDCG on Contributor Ranking

Contributor Statistics

Catagony	# users		avg $\#$ words			
Category		authored	reviewed	s(p)		
Non-registered	23,353	16.4	1,252.3	0.0		
Registered	9,816	56.2	5,235.3	1.0		
WikiProject:Country Participants	80	821.6	22,540.4	2.0		

NDCG@k Performance on Contributors

	NDCG@k								
k	Basic	PeerBoviow	P	robRevie	w				
	Dasic	reenteview	S^1	S^2	S^3				
33,249	0.881	0.911	0.878	0.872	0.873				
9,896	0.408	0.487	0.384	0.372	0.376				
80	0.222	0.392	0.293	0.255	0.259				

Road Map

Introduction

- Quality Measurement Models
 - Basic
 - PeerReview
 - ProbReview

3 Experimental Results

4 Related Work *

5 Conclusion

Wikipedia in Academic Research



Road Map

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Conclusion

- For collaboratively edited articles, quality can be measured based on the interaction among contributors.
- Carefully incorporate the authority of reviewers give good and robust performance.
- Future work
 - Counter–generalize contributors
 - Context–dependent authority/quality
 - Exploitation on derived authority
 - Model scalability

Thank You

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Thank You

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