TJU_GSummary at TAC 2011: Category Oriented Extractive Content Selection for Guided Summarization

He Ruifang，Fu Kang，Zhou Xinya
rfhe@tju.edu.cn

School of Computer Science and Technology
Tianjin University, China

Outline

- Viewpoint about guided summarization
- Methods of our systems
- Evaluation results
- Conclusion

Outline

- Viewpoint about guided summarization
- Methods of our systems
- Evaluation results
- Conclusion

Guided summarization

- Originate from the update summarization in DUC 2007
- The main difference
  - Topic is category oriented
  - But there is no topic description
  - Emergency related, such as natural disasters, accidents, attacks , public safety and so on.
- Accord with emergency management and crisis response

Question analysis (0)

from view of crisis management

First property: crises could be categorized, and have expected attributes, say aspects of an emergency, such as who, what, why

--This abstract semantic is different to annotate directly

--Make summary contain the different aspects of an emergency

Question analysis (1)

from view of data

Second property: data has the temporal evolution characteristic

--Deal with dynamic document collection of a single topic in continuous periods of time

from view of users

Third property: user needs have evolution characteristic

--Hope to incrementally care the important and novel information relevant to an emergency

New Challenges (extractive or generative)

- Semantic understanding of an emergency
- The capture of evolving information
- The balanced coverage of summary content

Just focus on the **extractive content selection**

How to model the importance and the redundancy of topic relevance and the content converge under the evolving data and user needs?

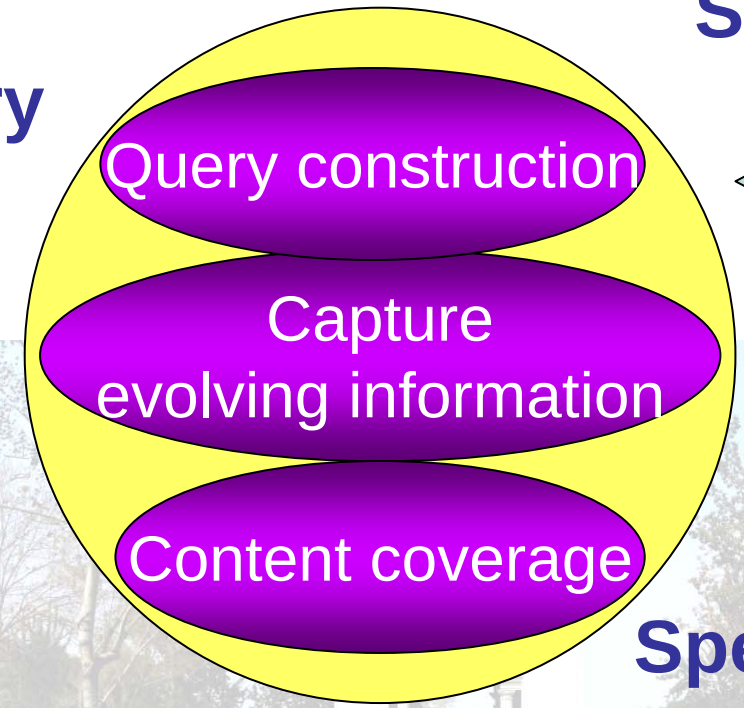
Outline

- Viewpoint about guided summarization
- Methods of our systems
- Evaluation results
- Conclusion

Explore the new manifold-ranking framework under the context of temporal data points!

Evolutionary manifold-ranking

Semantic of an emergency



Spectral clustering

Combine evolutionary manifold-ranking with spectral clustering to improve the coverage of content selection!

Query construction (0)

- There is no topic description, we need to predict the user needs
- Find the replaceable semantic structure understanding method of an emergency
- Verb and noun mostly trigger the happening of an event

Query construction (1)

- Use the simple statistical method to extract the trigger words
- Try to answer the aspects of what and why
- Do not use any web resources

Evolutionary manifold-ranking

Manifold-ranking ranks the data points under the intrinsic global manifold structure by their relevance to the query

Difficulty: not model the temporally evolving characteristic, as the query is static !

Assumption of our idea

Data points evolving over time have the long and narrow manifold structure

Motivation of our idea

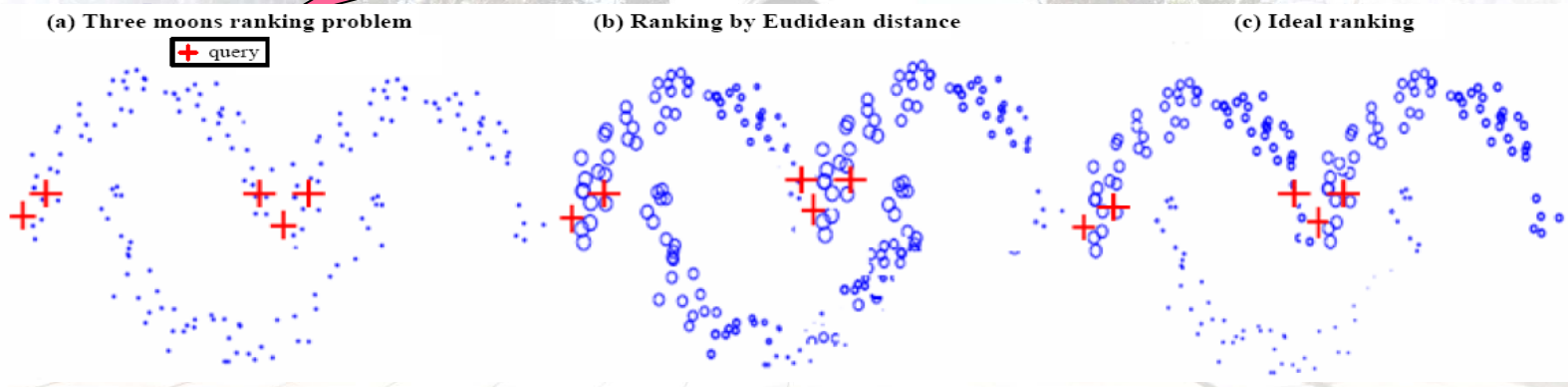
Add relay point of information propagation

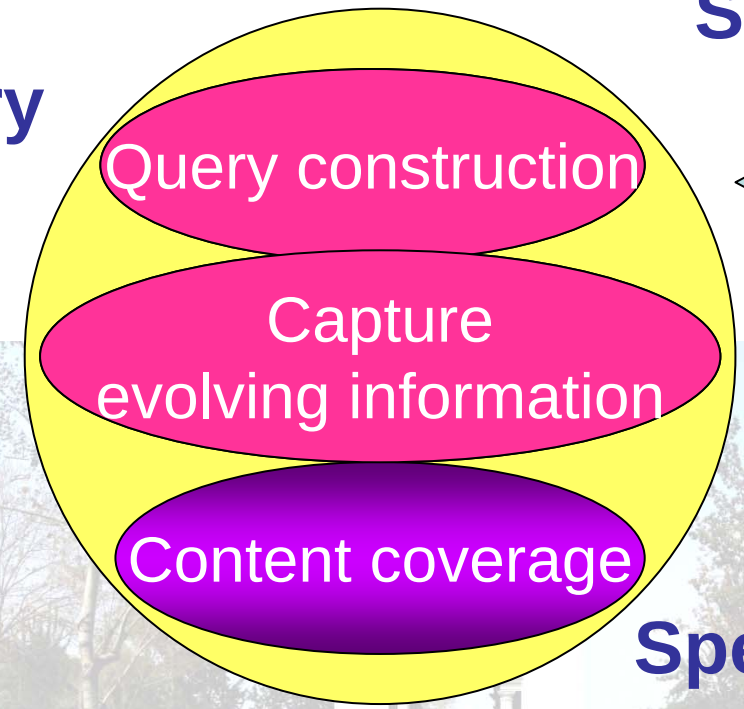
- Dynamic evolution of query
- Relay propagation of information

Iterative feedback mechanism in evolutionary manifold-ranki

- The summary vious time slices
- The first sen ents in current time

Relay point of information propagation





Semantic of an emergency

Evolutionary manifold-ranking

Spectral clustering

Spectral clustering based on eigenvector selection (0)

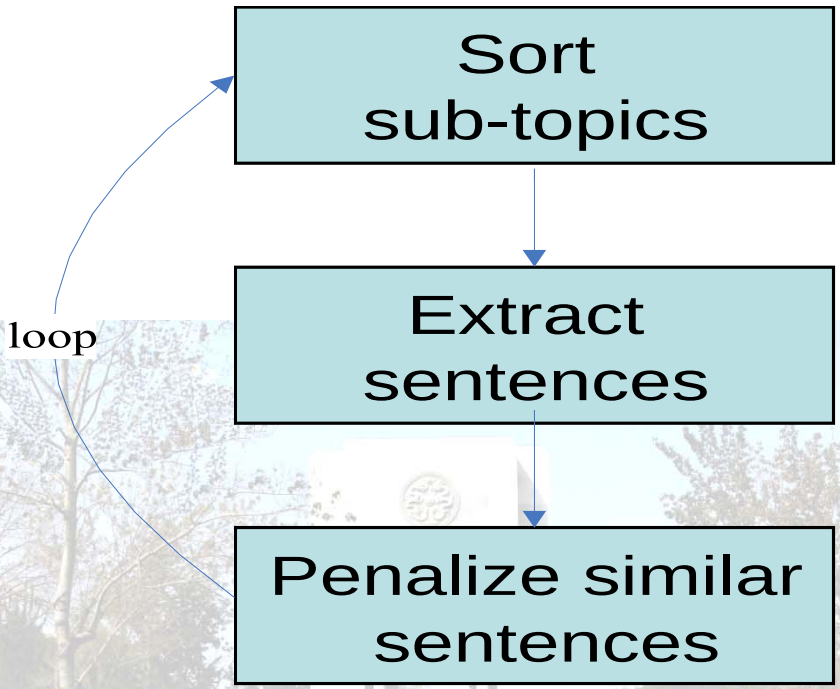
- Why choose the spectral clustering?
  - --Automatically determine the number of clusters
  - --Cluster the data points with arbitrary shape
  - --Converge to the globally optimal solution

- Center object of spectral clustering
  - --Graph Laplacian transformation
  - --Select normalized random walk Laplacian
    - Have good convergence

Spectral clustering based on eigenvector selection (1)

- Use the eigenvalue and eigenvector structure of a similarity matrix to partition data points into disjoint clusters
- However, not all eigenvectors are essential to clustering,
- Eigenvector selection based on entropy ranking

Sentence selection



no sub-topics →a greedy algorithm

Outline

- Viewpoint about guided summarization
- Methods of our systems
- Evaluation results
- Conclusion

System design

- **Experiments on TAC 2010**

  (1) query construction;

  (2) evolutionary manifold-ranking;

  (3) spectral clustering based on eigenvector selection

- **Run systems**

  RUN1(ID=13): (1) + (2);

  RUN2(ID=7): (1) + (2) + (3);

Evaluation results (0)

Table 1: The Evaluation Results of System 13,7 under PYRAMID metrics

Metrics	Our A		Best A	Model A	Rank	
	Score(ID=13)	Score(ID=7)	Score(ID)	Low,High(ID)	ID=13	ID=7
AMS	0.413	0.392	0.477 (22)		22/50	30/50
ANSCU	5.523	5.091	6.227(22,43)	9.182,11.455(F,G)	14/50	30/50
ANP	1.409	1.841	2(33)		11/50	2/50
MMS3M	0.409	0.387	0.471(22)	0.705,0.888(F,G)	22/50	30/50
ALQ	2.75	2.614	3.75(32)	4.591, 5 (F,(D,C,E))	32/50	36/50
AOR	3.114	2.773	3.159(25)	4.682,4.955 (F,(D,C))	3/50	31/50
Metrics	Our B		Best B	Model B	Rank	
	Score(ID=13)	Score(ID=7)	Score(ID)	Low,High(ID)	ID=13	ID=7
AMS	0.33	0.338	0.353 (9)		10/50	6/50
ANSCU	3.614	3.75	4.023(9)	5.409,8.091(B,D)	11/50	7/50
ANP	0.795	0.841	1(43)		8/50	5/50
MMS3M	0.326	0.333	0.346(12)	0.554,0.823(B,D)	10/50	7/50
ALQ	2.773	2.727	3.455(1)	4.727,5(F,H)	27/50	29/50
AOR	2.364	2.477	2.591(35)	4.318,4.909(F,G)	21/50	11/50

Evaluation results (1)

Table 2: The Evaluation Results of System 13,7 under ROUGE,BE metrics

Metrics	Our A		Best A	Model A	Rank	
	Score(ID=13)	Score(ID=7)	Score(ID)	Low,High(ID)	ID=13	ID=7
ROUGE-2	0.10934	0.09687	0.13447(43)	0.1282(D)	16/50	29/50
ROUGE-SU4	0.14340	0.13053	0.16519(43)	0.16412(D)	19/50	30/50
BE	0.06332	0.05707	0.08553(43)	0.09085(D)	29/50	32/50
Metrics	Our B		Best B	Model B	Rank	
	Score(ID=13)	Score(ID=7)	Score(ID)	Low,High(ID)	ID=13	ID=7
ROUGE-2	0.06759	0.06889	0.09589(43)	0.11474(E)	31/50	30/50
ROUGE-SU4	0.10692	0.10753	0.13080(43)	0.14941(E)	30/50	29/50
BE	0.03682	0.04047	0.06480(43)	0.07970(E)	35/50	32/50

Difficult to say good or bad!

What is the appropriate metrics?

Outline

- Viewpoint about guided summarization
- Methods of our systems
- Evaluation results
- Conclusion

Personal viewpoint

- ROUGE and BE →content selection of generative summary
  - Relatively short SCU
- PYRAMID→ content selection of extractive summary
  - Long SCU

Hope: extend the number of time slice of evolving data

Conclusion (0)

- **Propose the category oriented extractive content selection method for guided summarization**

  --semantic understanding of an emergency

  --evolutionary manifold-ranking;

  --spectral clustering based on eigenvector selection

Conclusion (1)

- **Future work**
  - -- label the semantic structure of an emergency
  - -- mining the temporal characteristic of the evolving information
  - -- better optimization method of parameters
- **Common topic**

  Further explore the appropriate evaluation method for update summary

Thank you!

Any question?