*h*MDS: The Next Step for Multi-Document Summarization

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*h*MDS in a nutshell

- novel heterogeneous multi-document summarization corpus
- poses new challenges for summarization systems
- novel construction approach makes corpus construction easy
- get more information at `https://github.com/AIPHES/hMDS`

Traditional Corpus Construction

1. search source documents by topic
2. identify important information in source documents
3. write a proper summary

problems:
- for high text quality, professional writers are require
- exponential complexity to read all documents
- domain knowledge required to estimate importance

→ **time-consuming + expensive**

executed e.g. for DUC 2004 / TAC 2008
→ very homogeneous corpora: only English newswire source documents, always 100 word summaries, etc.

Reversing Traditional Corpus Construction

1. select a summary
2. mark important information
3. retrieve source documents by information nuggets

advantages:
- high-quality summary already available
  e.g. Wikipedia featured articles: well-written, comprehensive, well-researched, stable
  → no text to write → no professional writer needed
- importance of information already assessed
  → no topic knowledge needed
- executable without human interaction?

result of corpus creation:
- heterogeneous, multi-genre source documents
- variable length source documents & summaries
- noisy source documents

Dimensions of Heterogeneity

Genres & Textual Heterogeneity

Lots of different text genres

microblog, encyclopedic short, organization, scientific, dialogues, education, article, encyclopedic long, forum post, social media

Textual Heterogeneity

based on Jensen-Shannon (JS) divergence of word distributions

$$\mathrm{TH}_{\mathrm{JS}}(\text{topic}) = \frac{1}{|\text{topic}|} * \sum_{\text{doc} \in \text{topic}} \mathrm{JS}\left(P_{\text{doc}}, P_{\text{topic} \setminus \text{doc}}\right)$$

	*h*MDS	DUC 04	TAC 08
Avg. $\mathrm{TH}_{\mathrm{JS}}$	0.3815	0.3019	0.3188

Observation:
- different text genres introduce high textual heterogeneity

Document Lengths

Summaries

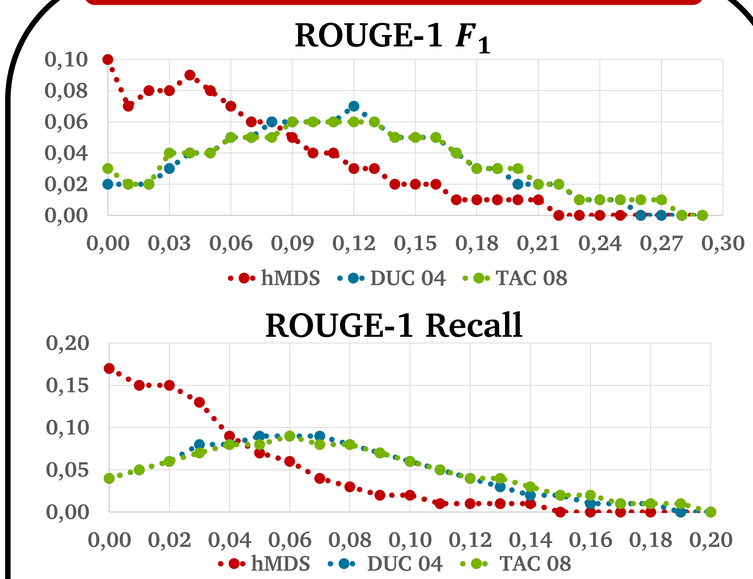
Corpus	Avg. Length (Words)	Relativ SD
*h*MDS	245.55 ± 132.94	0.54
DUC 04	118.11 ± 6.38	0.05
TAC 08	109.33 ± 7.01	0.06

Source Documents

Corpus	Avg. Length (Words)	Relativ SD
*h*MDS	1863.59 ± 3928.91	2.11
DUC 04	672.14 ± 6.38	0.75
TAC 08	589.20 ± 7.01	0.82

Observation:
- Documents in *h*MDS longer
- *h*MDS higher standard deviation
  - also in summaries!

Distribution of ROUGE Scores



Observation:
- DUC and TAC very similar
- *h*MDS much more poor sentences/noise
  → harder to summarize

Summarization Experiments

Corpus	*h*MDS-M	*h*MDS-A	*h*MDS-V	DUC 04	TAC 08
Optimal	*0.4960*	*0.4845*	*0.5018*	*0.1876*	*0.2540*
Random	0.0732	0.0594	0.0450	0.0435	0.0458
Lead	0.1237	0.0318	0.0018	0.0766	0.0765
LexRank	0.1273	0.1192	0.0797	0.0715	0.0773
ICSI	**0.2293**	**0.2267**	**0.2082**	**0.0900**	**0.1107**
LSA	0.0689	0.0652	0.0603	0.0430	0.0696
TF-IDF	0.0939	0.0805	0.0766	0.0657	0.0572

ROUGE-2 scores

Conclusions

- optimal scores much higher in *h*MDS
- ICSI performs best
- reference systems better suited to summarize classical datasets
- **larger gap to optimum: go for it!**
- LEAD (usually strong) performs poorly compared to reference systems
- performance decreases if more noise is present (M → A → V)

Challenge accepted!

get more information at
`github.com/AIPHES/hMDS`

current work on *h*MDS:
1. adding German topics
2. automating construction approach

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