Daily amount of news reporting real-world events is growing exponentially. Simultaneously, Organizations are looking for event information in a fast and summarized form to make decisions. Event-based summarization systems offer an efficient solution to this problem.

We proposed multi-document summarization methods based on the hierarchical combination of single-document summaries. We improved summarization methods using event information. Our approach is based on a two-stage single-document method that extracts a collection of key phrases, which are then used in a centrality-as-relevance model.

To adapt centrality-as-relevance single-document summarization for multi-document summarization that is able to use event information, we needed a good and adaptable baseline system. Because key phrase extraction is important in summarization, we improved a state-of-the-art key phrase extraction toolkit using four additional sets of semantic features. The event detection method is based on Fuzzy Fingerprint, which is a trained on documents with annotated event tags. We explored three different ways to integrate event information, achieving state-of-the-art results in both single and multi-document summarization using filtering and event-based features. We complemented event information with word embeddings.

The automatic evaluation and user study performed show that these methods improve upon current state-of-the-art multi-Document summarization systems on DUC 2007 and TAC 2009 evaluation datasets. We show a relative improvement in ROUGE-1 scores of 16% for TAC 2009 and of 17% for DUC 2007. We have also obtained improvements in ROUGE-1 upon current state-of-the-art single-document summarization systems of between 32% in clean data and 19% in noisy data. These improvements derived from the inclusion of key phrases and event information. Key phrase extraction was also refined with additional pre-processing steps and features, which lead to a relative improvement in NDCG scores of 9%. Event detection based on Fuzzy Fingerprints detected all event types, while an SVM only detected roughly 85% of them.