Automatic Summarization Of Legal Texts

Group 9

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Problem Statement

<u>Unsupervised Extractive Legal Document Summarization</u>

- To generate two summaries using maximum marginal reference for each full document in a collection of 50 , using two reference summaries of different lengths for each document.

- To calculate the average rogue scores for each set of summary for the collection

Approach towards solution

- We used the tf-idf vectorizer over the list of splitted documents, so that we can use that to obtain the tf-idf of a sentence.We obtain each sentence as a vector with unique words as columns.
- We then computed the similarities between each pair of sentences in the document and stored it in a 2-D array by computing the dot product of two vectors. For each sentence the maximum similarity was thus found by comparing the values for that sentence with other sentences by using the precomputed similarity values.
- We applied the Maximum Marginal Relevance(MMR) algorithm to find the summary as it increases the relevance of the sentences that are being added to the summary as well as reduce the redundancy
- We iterated through all the sentences in the document and found the maximum marginal relevance score of all the sentences and updated the summary by adding the sentence with the maximum marginal relevance score.

Approach towards solution

- We kept on adding sentences to the summary unless it crossed a particular threshold which was passed as a parameter.

- We read the files and generated the 2 summaries based on the reference summaries A1 and A2 for 3 values of λ: 0.3, 0.5, 0.7.

- We calculate the rogue scores for all the generated summaries with respect to the reference summaries and store the rogue-1,rogue-2,rogue-l scores in rogue.txt. Rouge score helps us to assess the adequacy of the summary by simply counting how many n-grams in your generated summary matches n-grams in our reference summary.

- We calculate and display the average of rogue scores of 50 documents at the end.

Algorithm

1. Divide the case document into sentences, each sentence being a separate document.
2. Initialize summary to be empty.
3. While the word count is below the desired word count we add to summary the sentence (From a given 'List of sentences' = Case document in our case) with 'maximal MMR (Maximal Marginal Relevance) score'.
4. MMR score = F(Sentence_to_be_added,Case_document)*λ - F(Sentence_to_be_added,Summary)*(1-λ).
5. Here F(Sentence_to_be_added,Some_document) = { i>= 0 and i < len(Some_document) } max(Similarity(Sentence_to_be_added,Some_document[i]))

Representation of the task
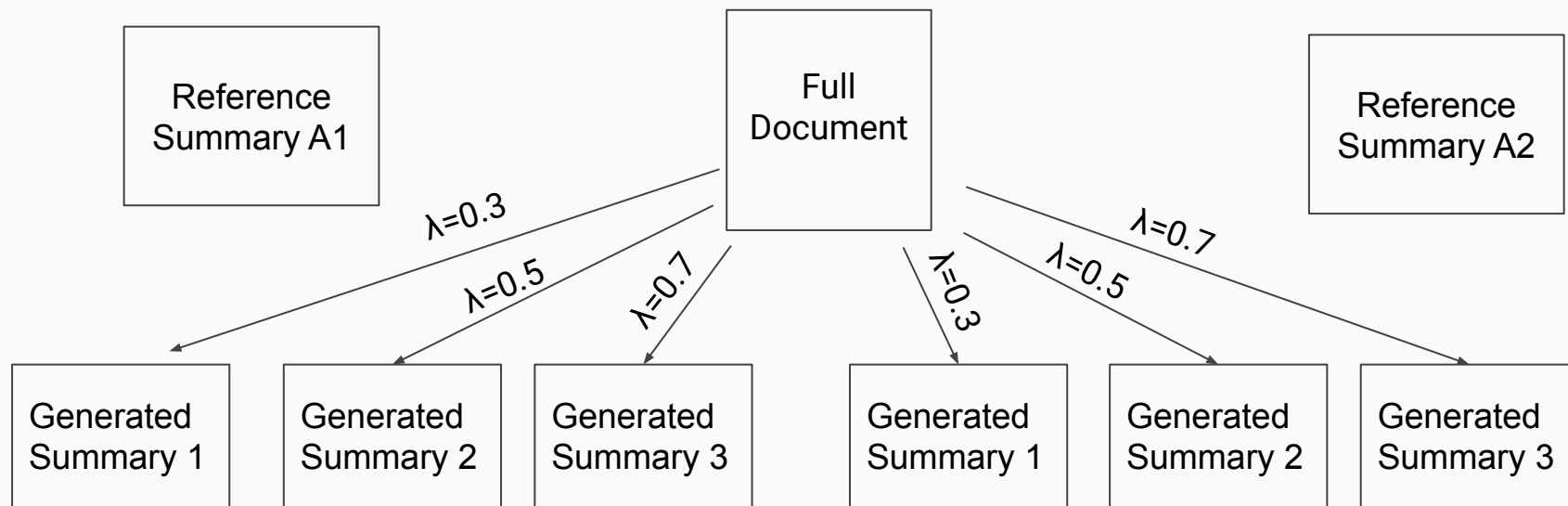
The summaries have been generated using Maximum Marginal Relevance where λ is a hyperparameter.

Results Obtained

Generated summary files for A1 and A2 summary sets

Generated Summary file list for A1 reference

- sumA1_1953_L_1_0.3.txt
- sumA1_1953_L_1_0.5.txt
- sumA1_1953_L_1_0.7.txt
- sumA1_1953_S_23_0.3.txt
- sumA1_1953_S_23_0.5.txt
- sumA1_1953_S_23_0.7.txt
- sumA1_1954_M_25_0.3.txt
- sumA1_1954_M_25_0.5.txt
- sumA1_1954_M_25_0.7.txt
- sumA1_1963_S_59_0.3.txt
- sumA1_1963_S_59_0.5.txt
- sumA1_1963_S_59_0.7.txt
- sumA1_1971_S_1_0.3.txt
- sumA1_1971_S_1_0.5.txt
- sumA1_1971_S_1_0.7.txt
- sumA1_1973_S_68_0.3.txt

Generated Summary file list with A2 reference

- sumA2_1953_L_1_0.3.txt
- sumA2_1953_L_1_0.5.txt
- sumA2_1953_L_1_0.7.txt
- sumA2_1953_S_23_0.3.txt
- sumA2_1953_S_23_0.5.txt
- sumA2_1953_S_23_0.7.txt
- sumA2_1954_M_25_0.3.txt
- sumA2_1954_M_25_0.5.txt
- sumA2_1954_M_25_0.7.txt
- sumA2_1963_S_59_0.3.txt
- sumA2_1963_S_59_0.5.txt
- sumA2_1963_S_59_0.7.txt
- sumA2_1971_S_1_0.3.txt
- sumA2_1971_S_1_0.5.txt
- sumA2_1971_S_1_0.7.txt
- sumA2_1973_S_68_0.3.txt

Generated summaries for lambda=0.3 , 0.5 , 0.7 for a particular document as A1 reference

Original full document-(1953 L 1.txt)

1. One Lakshminarayana Iyer, a Hindu Brahmin, who owned considerable properties in the Tirunelveli district, died on 13th December, 1924, leaving him surviving a widow Ranganayaki, and a married daughter Ramalakshmi. Ramalakshmi had married the plaintiff and had a number of children from him. They were all alive in December, 1924, when Lakshminarayana died, Before his death he executed a will on 16th November, 1924, the construction of which is in controversy in this appeal. By this will he gave the following directions --
"After my lifetime, you, the aforesaid Ranganayaki Amminal, my wife, shall till your lifetime, enjoy the aforesaid entire properties, the outstandings due to me, the debts payable by me, and the chit amounts payable by me. After your lifetime Ramalakshmi Ammal, our daughter and wife of Rama Ayyar Avergal of Melagaram village, and her heirs shall enjoy them with absolute rights and powers of alienation such as gift, exchange, and sale from son to grandson and so on for generations. As regards the payment of maintenance to be made to Chinnanmal alias Lakshmi Ammal, wife of my late son Hariharamayyan, my wife Ranganayaki Ammal shall pay the same as she pleases, and obtain a release deed".
2. Ranganayaki entered into possession of the properties on the death of her husband. On 21st February, 1928, she settled the maintenance claim of Lakshmi Ammal and obtained a deed of release from her by paying her a sum of Rs. 3,350 in cash and by executing in her favour an agreement stipulating to pay her a sum of Rs. 240 per annum.

Generated summary Lambda=0.3 (sumA1 1953 L 1 0.3.txt)

If it was the daughter's estate that was intended to be conferred, there can be no question that the estate taken by the grandsons is not a vested interest".
Though no restraint in express terms was put on her powers of alienation in case of necessity, even that limited power was not given to her in express terms.
" 25. Reliance was next placed on Maharaja of Kolhapur v. sundaram Iyer (1925) I.L.R. 48 Mad. 1.
"all my properties shall after my death be in possession of my wife herself and she herself should be heir to everything and Mutha Arunachala Chetty (nephew) and my wife, should live together amicably as of one family.

Generated summary Lambda=0.5(sumA1 1953 L 1 0.5.txt)

The main issue in the suit was whether- the widow took under the will an absolute estate or an estate like the Hindu widow's estate and whether the daughter's interest therein was in the nature of a contingent remainder, or whether she got in the properties a vested interest.
It is significant that the testator did not say in the will that the daughter will enjoy only the properties left indisposed of by the widow.
In this situation the inference that the testator must have of necessity intended to confer on the widow power of alienation for those limited purposes cannot be raised.
The words 'pass to my daughter' would rather indicate that in the ordinary course of devolution the estate should pass to her, that is, the daughter and then to the grandsons.
Both the learned counsel eventually conceded that the language used in the will was consistent with the testator's intention of conferring a life estate in the English sense as well as with the intention of conferring a Hindu widow's estate.
That was a case of a government grant on the special terms set out therein and the question arose as to the nature of the grant.

Generated summary Lambda=0.7(sumA1 1953 L 1 0.7.txt)

The words used in favour of the grandsons seem to indicate that the estate conferred on the daughter was not a life estate because there is no direct gift in favour of the grandsons, but on the other hand, what he says is that through his daughter the estate shall pass to his grandsons.
5. The subordinate judge held that the widow took under the will a limited life, interest, and not an absolute estate or even a widow's estate under Hindu law, and that the daughter got there under a vested interest in the properties to which the plaintiff succeeded on her death.
At one time it was a moot point whether a Hindu widow's estate could be created by will, it being an estate created by law, but it is now settled that a Hindu can confer by means of a will oil his widow the same estate which she would get by inheritance.
4. The defendants pleaded that the plaintiff had no title to maintain the suit, that the widow was entitled under the will to an absolute estate or at least to an estate

Average Rogue scores for each set of summary (A1 and A2)

Rouge score average for A1 Summary :-

	Rouge-1	Rouge-2	Rouge-l
F-Score	0.5033	0.2859	0.3857
precision	0.5006	0.2843	0.5525
recall	0.5062	0.2876	0.3899

Rouge score average for A2 Summary :-

	Rouge-1	rouge-2	rouge-l
F-Score	0.3464	0.1709	0.2506
precision	0.3474	0.1716	0.6542
recall	0.3460	0.1704	0.2214

Note:- In most documents we obtain 'High' rouge scores (>= 0.5).
Only some documents had a 'Low' score (< 0.3). This distorted the average very much.

Thank You