Text Summarization

Noah Gallant // Jacob House

Computer Science 4750
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Topic

Text Summarization // Automatic Abstracting

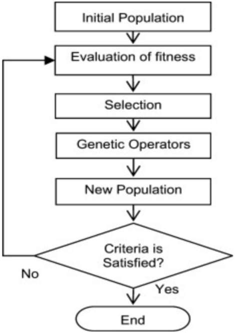
The process of reducing an input text to a smaller, more concise version of itself.

Use cases include: search engine results, academic research, legal contract analysis, and more advanced email inbox filtering.

Different Approaches

Evolutionary Algorithm

1. Assign weights to text features
2. Create population of distinct summaries
3. Assess fitness
4. Choose summaries with highest fitness
5. Create offspring from chosen summaries
6. Repeat steps 3–5 until the summary is concise enough

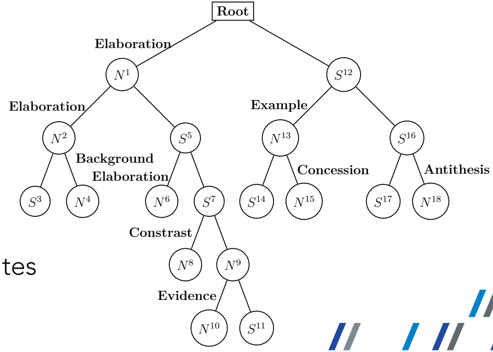


Different Approaches

Nested Tree

The goal in this approach is to repeatedly trim the tree until the desired summary size is reached.

- Tree structure is dependency based
  - Inter-sentence
  - Inter-word
- Tree trimming to reduce size
  - Removes duplicates
  - Removes less important nodes



Different Approaches

Graph-Based

- Nodes created for each sentence
- Edges added between sentence nodes
  - Adjacent sentences in the text
  - Sentences that share common words
- Edges with higher weight denote dependency
- Nodes (sentences) with highest total edge weight should be included in the summary

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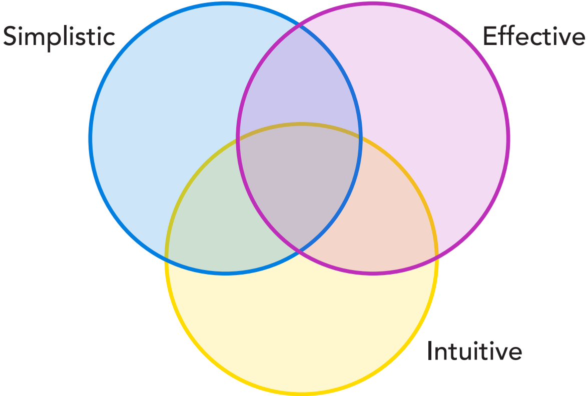
Our Design



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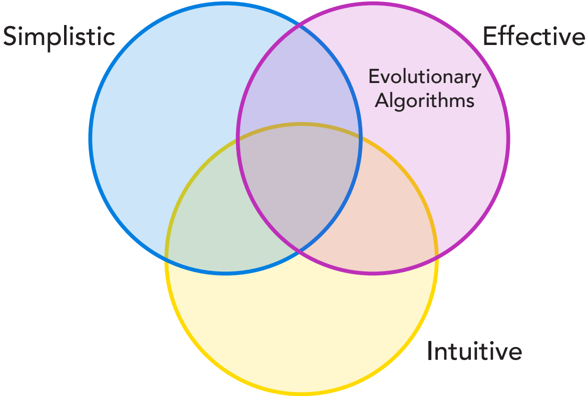
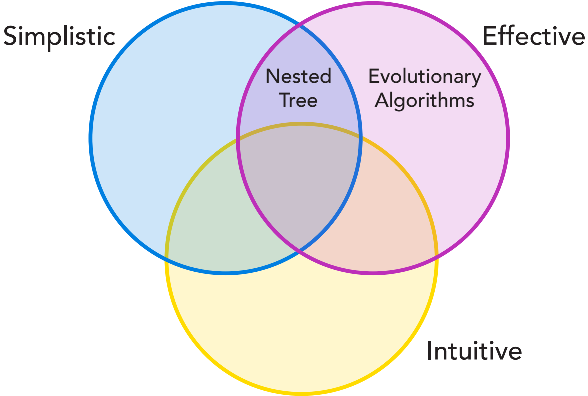

Simplistic
Effective
Evolutionary Algorithms
Intuitive

Our Design



Simplistic

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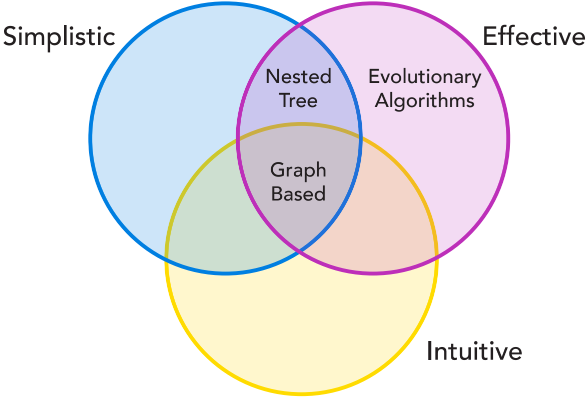

Simplistic

Effective

Intuitive

Nested Tree

Evolutionary Algorithms

Graph Based

Implementation

Preprocessing

- Sentence separation
- Deals with special/unicode characters

Implementation

The `Graph` Class

The `Graph` class is a singleton which contains all the nodes and edges. It is the responsibility of this class to do the text preprocessing, and to create nodes and the edges between them.

- Contains a list of:
    - Nodes
    - Edges
    - Words in the text

Implementation

The Node Class

A new node object is created for every sentence in the input text. It contains the sentence, a list of words in the sentence, and a list of edges which associate it with other sentence nodes.

- Initialized with 2 edges
    1. Connecting the preceding sentence
    2. Connecting the following sentence
- More edges are added between nodes that share a common word

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Implementation

The Edge Class

The Edge class contains the two nodes it is connecting, as well as the information about the connection.

This information includes the words connecting the sentences, as well as if they are sentences connected by proximity.

Questions?

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