

# Sentiment Analysis and Summarization of Product Reviews using Deep Learning Techniques

## End Term Evaluation

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# Agenda

1. Introduction
2. Problem Statement
3. High Level Design
4. Low Level Design
5. Concept Clarity
6. Dataset

# Introduction

- As potential customers, people usually seek help from the online portals to gain knowledge on a particular product, and finally, decide if the purchase should be made or not.
- It takes several hours to read all the reviews, sometimes even leading to missing out the important ones, thus ending up making the wrong decision on purchasing the product.
- A more well defined and concise product review is proposed such that the user need not skim through all the reviews, thus saving their time and effort.
- As a solution to the ongoing problem that the customer experiences daily, automatic review summarization will be used to analyze the product reviews and convert them into a user-readable and in a more concise and precise format.

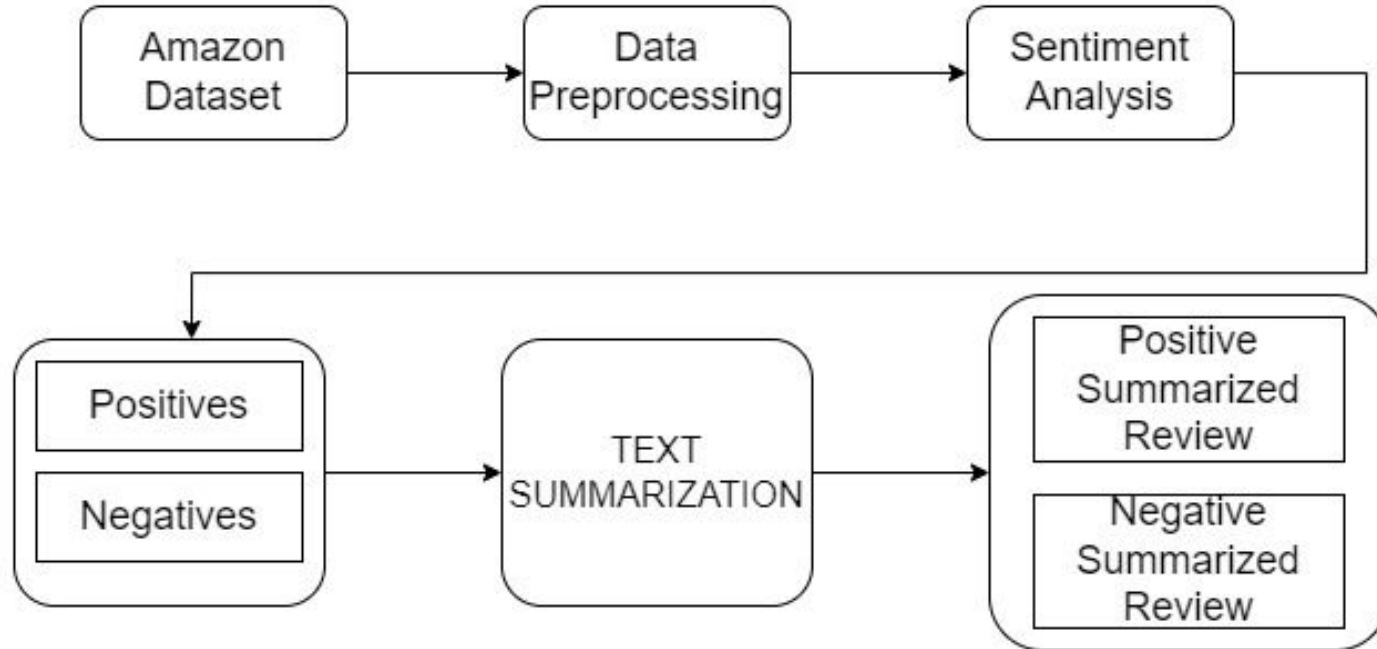
# Problem Statement

## Sentiment Analysis and Summarization of Product Reviews using Deep Learning Techniques

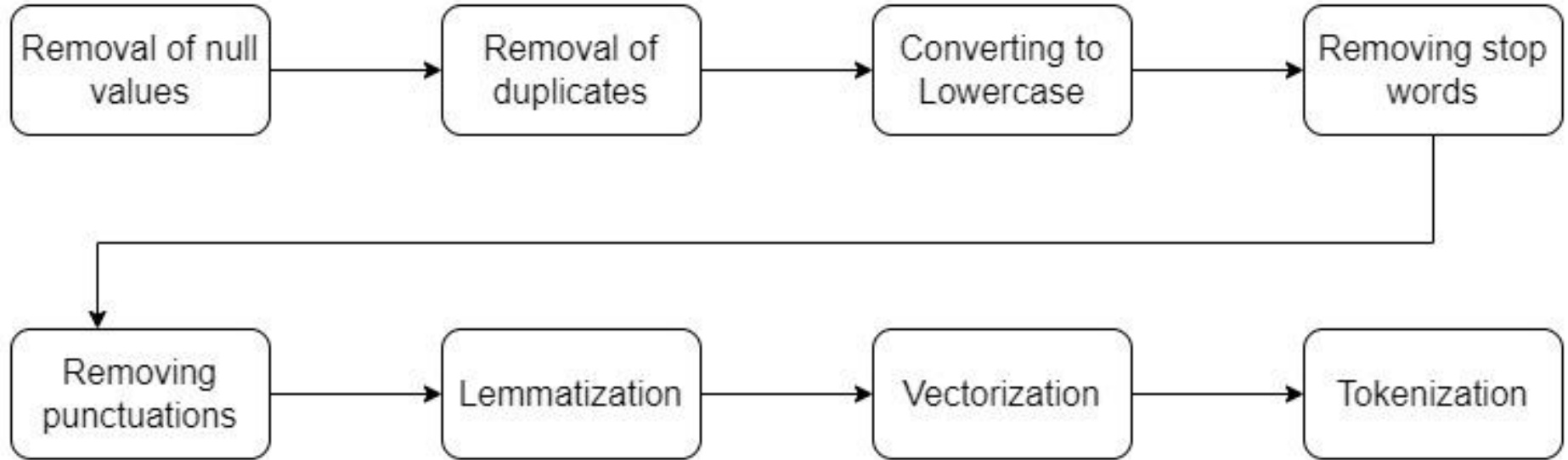
### Objectives:

- To provide a brief abstractive summary of a product with a large number of reviews available in order to take a quick glance at both the pros and cons of any product.
- We will tackle the above problem using deep learning techniques like LSTM-attention mechanism and/or BERT.
- We will have 2 phases: classification and summarization
- Processing techniques will be same for summarization, we only have to perform processing once.

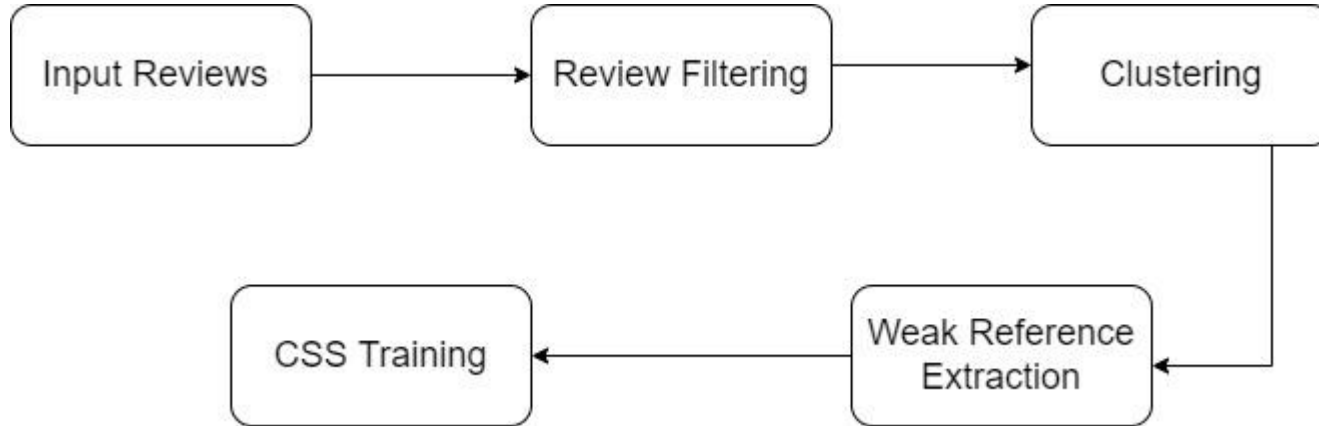
# High Level Architecture Diagram



# Low Level - Data Preprocessing



# Low Level - Text Summarization



# Concept Clarity

1. Lemmatization
2. Vectorization
3. Tokenization
4. BERT
5. Clustering
6. CSS Training
7. Weak Reference Extraction
8. LSTM - with attention mechanism



# Innovation & Applicability

1. No application has been made until now which uses abstractive summarization as a summarization technique.
2. This application can be applicable in multiple e-commerce sites like amazon, flipkart, myntra, etc which has many no of reviews for a particular product and reading all reviews is a tedious process.
3. In future, this can also be applicable in famous movie review sites like IMDB, Rotten Tomatoes, google movies for a summarized review of any particular movie.

## **Dataset** - Amazon Review Dataset - 2018

- This dataset includes reviews metadata like ratings, text, helpfulness, votes.  
Product metadata like descriptions, category information, price, brand, etc.
- The format of this dataset one review per line in JSON
- This dataset contains reviews of each categories of products like books, electronics, movies, sports etc.
- This dataset contains 34 gb of data and contains 233.1 million reviews.

# Dataset - Sample Review

## Sample Review:

```
{
  "reviewerID": "A2SUAM1J3GNN3B",
  "asin": "0000013714",
  "reviewerName": "J. McDonald",
  "vote": 5,
  "style": {
    "Format": "Hardcover"
  },
  "reviewText": "I bought this for my husband who plays the piano.
He is having a wonderful time playing these old hymns. The music is
at times hard to read because we think the book was published for
singing from more than playing from. Great purchase though!",
  "overall": 5.0,
  "summary": "Heavenly Highway Hymns",
  "unixReviewTime": 1252800000,
  "reviewTime": "09 13, 2009"
}
```

# References

- [1] Desai, Z., Anklesaria, K., & Balasubramaniam, H. (2021, July). Business Intelligence Visualization Using Deep Learning Based Sentiment Analysis on Amazon Review Data. In *2021 12th International Conference on Computing Communication and Networking Technologies (ICCCNT)* (pp. 1-7). IEEE.
- [2] AlQahtani, A. S. (2021). Product Sentiment Analysis for Amazon Reviews. *International Journal of Computer Science & Information Technology (IJCSIT) Vol, 13*.
- [3] L. Rong, Z. Weibai and H. Debo, "Sentiment Analysis of Ecommerce Product Review Data Based on Deep Learning," 2021 IEEE 4th Advanced Information Management, Communicates, Electronic and Automation Control Conference (IMCEC), 2021, pp. 65-68, doi: 10.1109/IMCEC51613.2021.9482223.
- [4] Aishwarya, N., Bhuvana, L. S., & Kayarvizhy, N. (2021, August). Summarization and Prioritization of Amazon Reviews based on multi-level credibility attributes. In *2021 International Conference on Recent Trends on Electronics, Information, Communication & Technology (RTEICT)* (pp. 5-9). IEEE
- [5] P. Porntrakoon, C. Moemeng and P. Santiprabhob, "Text Summarization for Thai Food Reviews using Simplified Sentiment Analysis," 2021 18th International Joint Conference on Computer Science and Software Engineering (JCSSE), 2021, pp. 1-5, doi: 10.1109/JCSSE53117.2021.9493839.

- [6] F. Rustam, A. Mehmood, M. Ahmad, S. Ullah, D. M. Khan and G. S. Choi, "Classification of Shopify App User Reviews Using Novel Multi Text Features," in *IEEE Access*, vol. 8, pp. 30234-30244, 2020, doi: 10.1109/ACCESS.2020.2972632.
- [7] J. Shah, M. Sagathiya, K. Redij and V. Hole, "Natural Language Processing based Abstractive Text Summarization of Reviews," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), 2020, pp. 461-466, doi: 10.1109/ICESC48915.2020.9155759.
- [8] Shapira, O., & Levy, R. (2020). Massive multi-document summarization of product reviews with weak supervision. *arXiv preprint arXiv:2007.11348*.
- [9] Chan, H. P., Chen, W., & King, I. (2020, July). A unified dual-view model for review summarization and sentiment classification with inconsistency loss. In *Proceedings of the 43rd International ACM SIGIR Conference on Research and Development in Information Retrieval* (pp. 1191-1200).
- [10] Ravali Boorugu, Dr. Gajula Ramesh, Dr. Karanam Madhavi (2019). Summarizing Product Reviews Using NLP Based Text Summarization. *International Journal of Scientific & Technology Research*
- [11] Ma, S., Sun, X., Lin, J., & Ren, X. (2018). A hierarchical end-to-end model for jointly improving text summarization and sentiment classification. *arXiv preprint arXiv:1805.01089*.
- [12] Tohalino, J. V., & Amancio, D. R. (2018). Extractive multi-document summarization using multilayer networks. *Physica A: Statistical Mechanics and its Applications*, 503, 526-539.

**THANK YOU !!**