Problem Statement:

Customer reviews or ratings aim to define the attitude of the writer towards the product. It may be positive, negative, or neutral. Some people give a product four or five stars and express their final satisfaction with it, and others give a product one or two stars and express their final dissatisfaction with it. This does not present any difficulty in sentiment analysis. However, other people give three stars, although obviously expressing their final satisfaction with it. This leads to confusing other customers, as well as companies, who want to know their actual opinion. Customers rely heavily on Amazon product reviews to make informed purchasing decisions. However, the sheer volume of reviews for popular products makes it difficult to manually assess overall customer sentiment and identify key positive and negative aspects. This project aims to develop an application that automates the sentiment analysis of Amazon product reviews, providing users with a concise understanding of customer opinions.

Abstract:

Recently, Ecommerce has Witnessed Rapid Development. As A Result, Online Purchasing has grown, and that has led to Growth in Online Customer Reviews of Products. The Implied Opinions in Customer Reviews Have a Massive Influence on Customer's Decision Purchasing, Since the Customer's Opinion About the Product is Influenced by Other Consumers' Recommendations or Complaints. This project proposes the development of an application that employs Natural Language Processing (NLP) to analyze Amazon product reviews and determine customer sentiment. The application will collect review data, preprocess the text, apply sentiment analysis techniques, and present the results in an easily understandable format. This will enable users to quickly gauge product sentiment and identify trends in customer feedback.

Introduction:

Nowadays, the world is becoming digitalized. eCommerce is taking ascendancy in this digitalized world through the availability of products within reach of customers. In fact, people are increasingly relying on the experiences of other customers. Online reviews have become a critical factor in e-commerce. Amazon, as a leading online retailer, hosts a vast number of product reviews. Analyzing these reviews can provide valuable insights for both consumers and sellers. For consumers, sentiment analysis can facilitate quicker and more informed purchase decisions. For sellers, it can offer feedback on product strengths, weaknesses, and areas for improvement. This project will focus on building an application to automate this process. The first goal is to get the sentiments expressed in the customer reviews and analyze the frequency of the sentiments. The second project goal is to build and train a machine learning model that can be used to classify customer reviews into two sentiments (positive or negative).

Literature Review:

Paper Title	Authors	Year	Methodology
Sentiment Analysis on Amazon product reviews	Aman Saridena	2024	Neural network model
Leveraging Large-Language Models based Machine Learning for Sentiment Analysis and Regional Consumer Insights in Amazon Product Reviews	Anushka Singh	2024	LLM Model
An Integrated Approach for Amazon Product Reviews Classification Using Sentiment Analysis	Deepika Kumar, Ritik Agarwal	2020	Sentiment Classification
Enhancing sentiment analysis classification for amazon product reviews using CNN- sigTan-Beta activation function	P. Anbumani	2023	ABO-RF algorithm
Sentiment Analysis of Amazon Reviews using NLTK Vader and Robert	Jitendra Soni	2024	NLTK

Methodology:

1. **Data Collection:**
    - Utilize web scraping techniques or Amazon's API (if available) to collect product reviews.
    - Store the collected data in a structured format (e.g., CSV, JSON, database).

2. **Text Pre-processing:**
    - Clean the text data by removing HTML tags, special characters, and irrelevant information.
    - Tokenize the text into individual words.
    - Remove stop words (e.g., "the," "a," "is").
    - Perform stemming or lemmatization to reduce words to their root form.

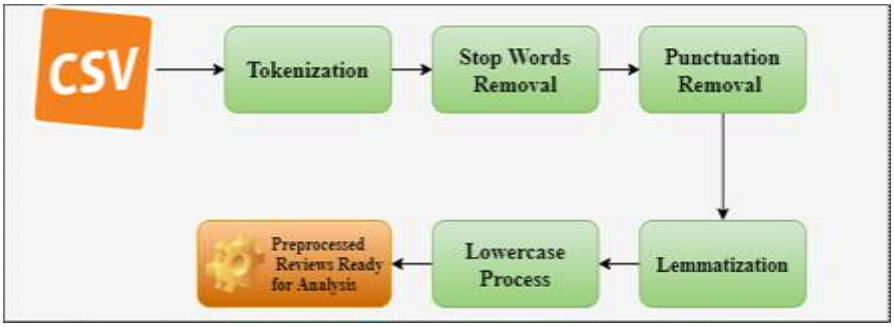

Figure- Pre-processing

3. **Sentiment Analysis:**
    - Train a machine learning model (e.g., Naive Bayes, SVM, or deep learning models like BERT) on a labelled dataset of Amazon product reviews with sentiment labels (positive, negative, neutral).
    - Apply the trained model to the pre-processed reviews to predict sentiment scores.

4. **Visualization and Reporting:**
    - Develop visualizations to represent sentiment distribution (e.g., bar charts, pie charts).
    - Generate reports summarizing the key findings, including the overall sentiment score, positive and negative review highlights, and common themes.
    - Consider aspect based sentiment analysis for more detailed analysis.

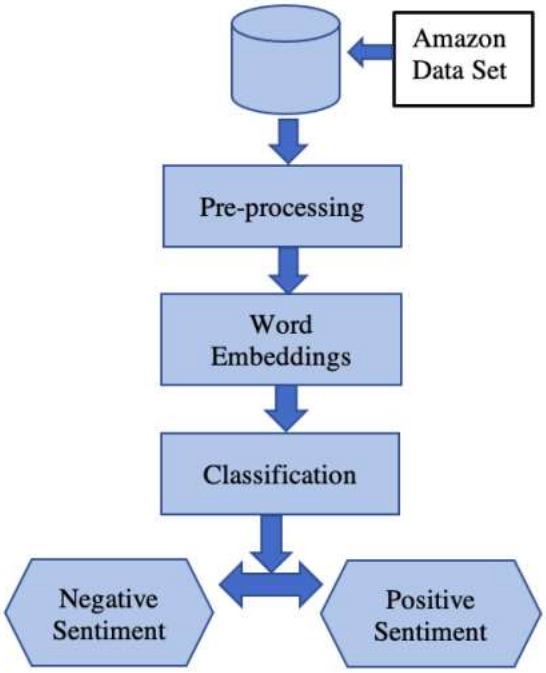

Figure – Architecture of our model

Result:

- An overall sentiment score for a given Amazon product.
- A visual representation of the sentiment distribution (e.g., a pie chart showing the percentage of positive, negative, and neutral reviews).
- A list of the most frequent positive and negative words or phrases found in the reviews.

Conclusion:

This project will develop a valuable application for analyzing Amazon product reviews, enabling users to quickly and efficiently understand customer sentiment. The application's insights will be beneficial for both consumers in making informed purchasing decisions and product vendors in identifying areas for improvement.

Reference:

https://www.researchgate.net/publication/370515793_Sentiment_analysis_on_Amazon_Product_Reviews

https://www.researchgate.net/publication/387647931_Leveraging_Large-Language_Models_based_Machine_Learning_for_Sentiment_Analysis_and_Regional_Consumer_Insights_in_Amazon_Product_Reviews

https://www.researchgate.net/publication/344518660_Sentiment_Analysis_on_Amazon_Product_Reviews_with_Stacked_Neural_Networks?_sg=kKQ-r6LPP07g4QrvKgBb04Dn2n30R4pFgPUNzEpWqX5Qick00Pgq9uaD6YraQ5GuwAXuYN3ap3H-B5A&_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6Il9kaXJlY3QiLCJwYWdlIjoiX2RpcmVjdCJ9fQ

https://www.researchgate.net/publication/381356482_Sentiment_Analysis_of_Amazon_Reviews_using_NLTK_Vader_and_Robert