



# Aspect Based Sentiment Analysis using Dynamic Reviews

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# Introduction

The reviews posted by customers are the globally trusted source of genuine content for other users

Aspect-Based Sentiment Analysis (ABSA) is the task of determining the sentiment of a text with respect to a specific aspect. Ex - 'Battery' is an aspect of 'Phone'

A dynamic review processing system extracts the latest reviews and analyses the performance of its various aspects over a period.

The system provides visual insights into variations in product performance, compared with that of previous weeks.



# Motivation

The wide-ranging application of sentiment analysis along with the integration of dynamic real-time reviews and aspect-based consideration diverted our attention to this path.

The predominant use of pre-defined datasets for sentiment analysis

Dynamic reviews are real-world responses and comments from actual users.

The performance of a product is ever-changing. There is a need for a system that takes into consideration the latest reviews provided by users



# Objectives

- To extract data from various data source and apply preprocessing techniques
- To identify the aspect term, its category along with the polarity.
- Develop an ELT pipeline to get dynamic reviews
- To provide visual insights into the product performance by processing reviews over several weeks.

# System Architecture

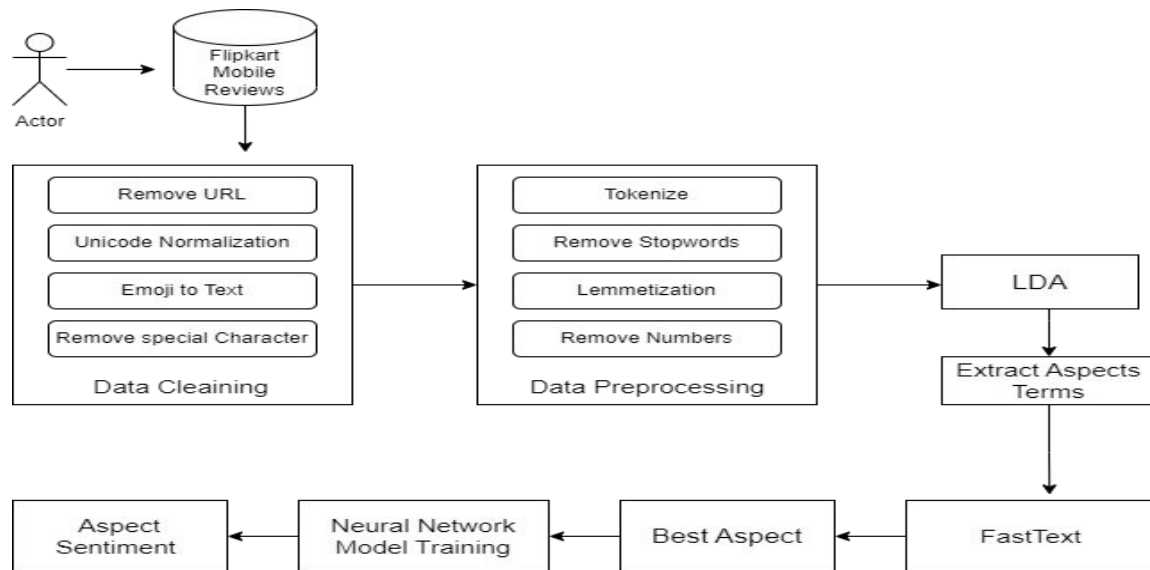


Fig 1: ABSA Training System Architecture

# System Architecture

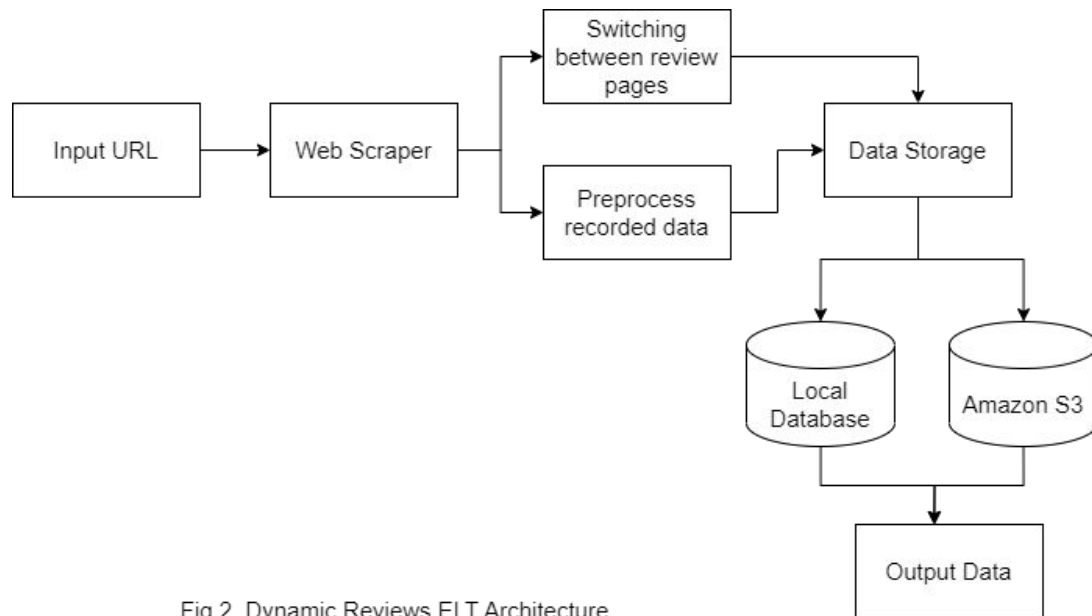


Fig 2. Dynamic Reviews ELT Architecture

# System Architecture



Fig 3: ABSA on Dynamic Reviews





## Dataset description - Training

The data is fetched from the Flipkart India web page contains 82 tables that contain reviews of 82 mobile phones.

Tables containing reviews of 82 mobile phones have the following attributes

- product\_id
- review\_id
- title
- review
- likes
- dislikes
- ratings
- reviewer

# Dataset description

	product_id	product_name	price	category	sub_category	specifications	ratings	discount	moreinfo
0	ECMB000001	Redmi 9A (SeaBlue, 32 GB)	₹7,413	Electronics	Mobile	2 GB RAM   32 GB ROM16.59 cm (6.53 inch) Full ...	4.3	3.0	/redmi-9a-seablue-32-gb/p/itmeabd39a0cd669?pid...
1	ECMB000002	Redmi 9A (Midnight Black, 32 GB)	₹7,421	Electronics	Mobile	2 GB RAM   32 GB ROM16.59 cm (6.53 inch) Full ...	4.3	3.0	/redmi-9a-midnight-black-32-gb/p/itmeabd39a0cd...
2	ECMB000003	Redmi 9A (Nature Green, 32 GB)	₹7,384	Electronics	Mobile	2 GB RAM   32 GB ROM16.59 cm (6.53 inch) Full ...	4.3	4.0	/redmi-9a-nature-green-32-gb/p/itmeabd39a0cd66...
3	ECMB000004	Redmi 9 (Carbon Black, 64 GB)	₹10,745	Electronics	Mobile	4 GB RAM   64 GB ROM16.59 cm (6.53 inch) HD+ D...	4.2	None	/redmi-9-carbon-black-64-gb/p/itm4fb151383983b...
4	ECMB000005	Redmi 9 (Sky Blue, 64 GB)	₹10,489	Electronics	Mobile	4 GB RAM   64 GB ROM16.59 cm (6.53 inch) HD+ D...	4.2	None	/redmi-9-sky-blue-64-gb/p/itm4fb151383983b?pid...

# Dataset description - Dynamic Reviews

An ELT pipeline is developed which scrapes latest reviews from website. These reviews are then stored in DB and S3 storage.

product-reviews-final-year [Info](#)

**Objects** Properties Permissions Metrics Management Access Points

**Objects (5)**

Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly [share](#) them.

[Refresh](#) [Copy S3 URI](#) [Copy URL](#) [Download](#) [Open](#) [Delete](#) [Actions](#) [Create folder](#) [Upload](#)

<input type="checkbox"/>	Name	Type	Last modified	Size
<input type="checkbox"/>	<a href="#">Ulefone1.json</a>	json	March 27, 2023, 12:55:27 (UTC+05:30)	31.3 KB
<input type="checkbox"/>	<a href="#">Ulefone2.json</a>	json	March 27, 2023, 12:55:54 (UTC+05:30)	68.8 KB
<input type="checkbox"/>	<a href="#">Ulefone3.json</a>	json	March 27, 2023, 12:56:28 (UTC+05:30)	106.3 KB
<input type="checkbox"/>	<a href="#">Ulefone4.json</a>	json	March 27, 2023, 12:57:43 (UTC+05:30)	143.8 KB
<input type="checkbox"/>	<a href="#">Ulefone5.json</a>	json	March 27, 2023, 12:58:40 (UTC+05:30)	181.2 KB

# Dataset description - Dynamic Reviews

```
"name": "Ulefone",  
"reviews": [  
  "I loved the phone, except it was very confusing due to not having the right options displayed on front, & of course, no instructions. It would open up, but only so far, as it wouldn't sync with phone com  
  "I bought this for a Xmas gift for my 14yr old daughter. We love the color and design and large screen, but overlooked the storage 1gb by accident. It works well with Whatsapp but unable to download much  
  "Very easy to operate.",  
  "Let me start by saying that amazon took over this item from the vendors who were selling it. Before their were apps outsourcing my info to an unknown source across seas. My Norton security picked up on i  
  "Needed something quick and cheap to replace my other phone it's a nice budget phone haven't had any issues.",  
  "I've been using this phone for about six months and have been enjoying it except for a few problems. Over all its a great rugged phone. Its been droppoe, thrown, stepped on, hit and taken in the water a  
    The media could not be loaded.",  
  ",  
  "\u00a0I'm really glad I decided to take a chance on this phone and order it. The quality of the phone is amazing. It is rugged and it has a built-in case on it. So I don't need to buy a case for it like  
  "I have only had this phone fore a couple of weeks, I am disappointed in the promise of high performance, yet when browsing the internet it freezes and studders. I have a decent connection of 100mbs down.  
  "So the facial recognition on this phone is a joke ...it never recognizes me so I have to default to the pin code. I saw reviews indicating the processing speed was slow, I concur!!! it really is slow. S  
  "I\u00a0starting to think people just like doing the most and being negative for any reason. With that being said for the price it\u00a0not bad at all. I purchased the phone for an extra leisure phone  
  "Appearance: the screen looks like Iphone X series. However, it only displays in a rectangle like other Android, of course.USB cable: type CWireless charging: it definitely works but I notice that it take  
  "I bought this phone for my granddaughter a little over a month ago it was delivered on the 5th of July now I cannot get it to charge. It's dear and wouldn't charge. Not good I don't recommend anyone to b  
  "Definitely very very durable. The WiFi is spotty, it'll just randomly cut out and i have to shut down the WiFi, wait a minute, then start it again. apps seem to crash a bit more often than other phones i  
  "I had high hopes for this phone and I wanted to like it, I really did. The feel and look of the phone was nice but the tech is lacking. First of all every time I call someone they keep telling me that  
  "This phone is a fantastic value for the money. I bought it to use while in between phones since Pixel 3 was being repaired. It isn't quite as sophisticated but considering the price I am impressed.Like  
  "Runs slow but okay",  
  "I have resisted getting a larger phone because I keep mine in my front pocket. The battery life is what sold me on this one, and I am glad that it did. I can go several days with heavy use on a single
```



# Dataset preprocessing

## Data Cleaning

- Remove URLs
- Unicode Normalization
- Handle Emojis
- Remove Special Characters

## Data preprocessing

- Remove Stopwords
- Lemmatization
- Tokenization



## Results

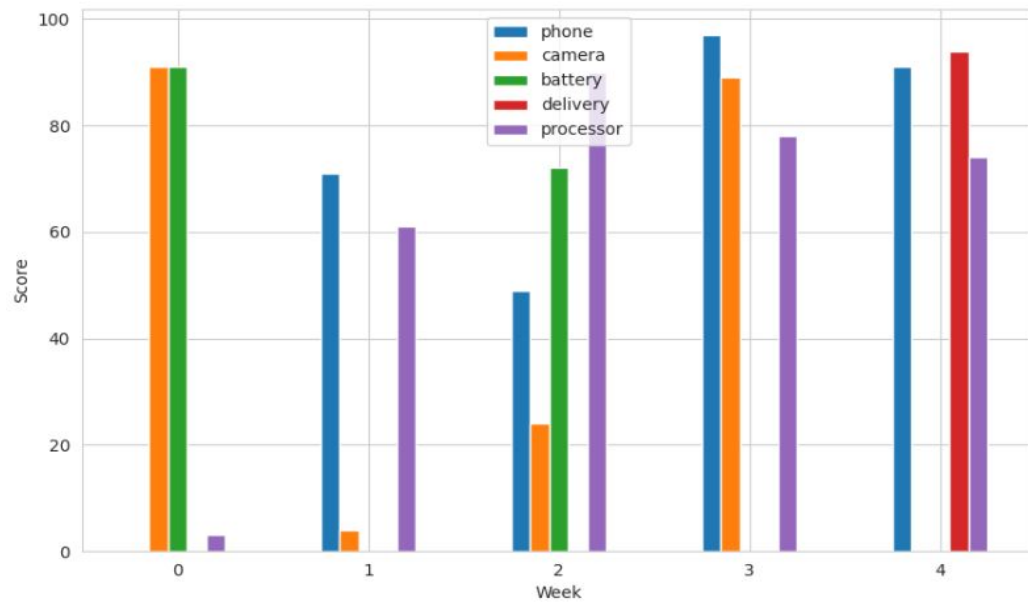
```
(0,
 '0.034*camera" + 0.033*phone" + 0.018*great" + 0.018*battery" + '
 '0.016*good" + 0.016*best" + 0.015*awesome" + 0.015*price" + '
 '0.012*product" + 0.012*quality''),
(1,
 '0.034*face" + 0.032*phone" + 0.014*smile" + 0.013*camera" + '
 '0.013*kiss" + 0.012*awesome" + 0.012*blowing" + 0.012*good" + '
 '0.012*price" + 0.011*bad''),
(2,
 '0.046*phone" + 0.034*good" + 0.033*camera" + 0.019*battery" + '
 '0.017*awesome" + 0.015*mobile" + 0.014*flipkart" + 0.013*performance" + '
 '0.013*great" + 0.012*price''),
(3,
 '0.065*phone" + 0.038*bad" + 0.032*evil" + 0.028*camera" + 0.021*price" '
 '+ 0.019*battery" + 0.016*flipkart" + 0.014*awesome" + '
 '0.014*performance" + 0.014*redmi''),
(4,
 '0.061*phone" + 0.024*good" + 0.021*battery" + 0.019*nice" + '
 '0.018*camera" + 0.014*price" + 0.011*flipkart" + 0.011*redmi" + '
 '0.011*great" + 0.010*best''),
(5,
```



## Results

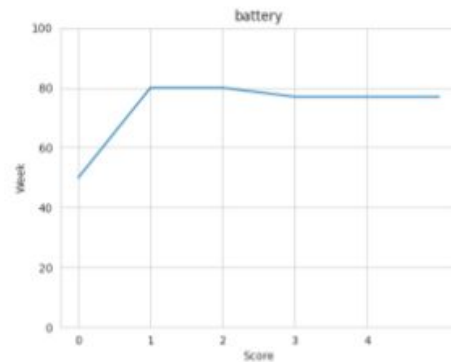
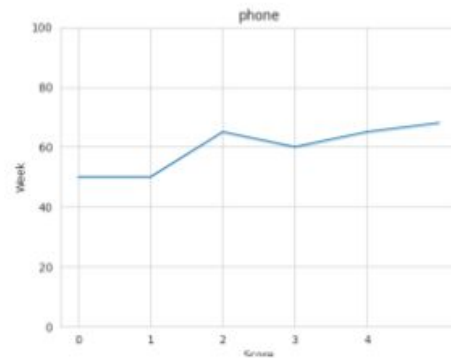
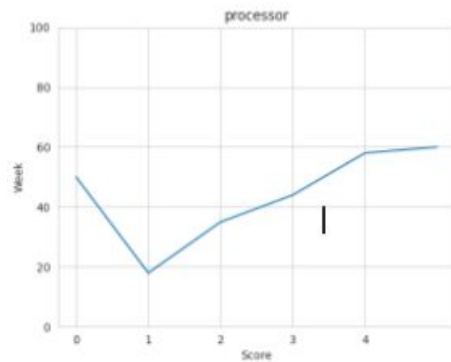
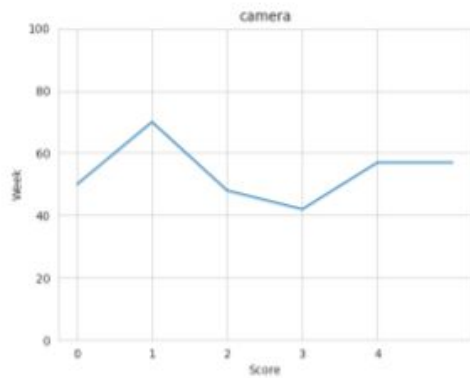
Review	Aspect	Sentiment	Predicted_Aspect	Predicted_Sentiment
phone's great b...	Battery	positive	battery	positive
evil processor	processor	negative	processor	negative
amazing battery	battery	positive	battery	positive
best camera	camera	positive	camera	positive
worst phone	Phone	negative	phone	negative

# Results





# Results





## Conclusion

- Use of LDA for the task of extraction of aspect terms
- Use of fasttext to compare and get the best aspect of the chosen aspect terms
- Model performs well with dynamic reviews and is a major advancement in the field of Aspect-Based Sentiment Analysis.
- A Neural Network modelled to identify the sentiment of the aspect.
- An ELT pipeline to get the data and pre-process it periodically
- Graphs for visual insights into variation of product performance



## Future Work

- Develop an event-driven system
- Consider each review as an event and each event is processed in real-time.
- Build a highly interactive User Interface that helps us input the URL of a specific product which will trigger the ELT pipeline.
- Explore other aspect extraction models and techniques such as Gensim.
- Explore aspect categorization and multi-language models to expand the scope



**THANK YOU!**