Dimensional Aspect-Based Sentiment Analysis (dimABSA)

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What is dimABSA?

- dimABSA stands for **Dim**ensional **A**spect-**B**ased **S**entiment **A**nalysis

What is Sentiment Analysis?

- Sentiment analysis means to analyze text & identify the emotion being expressed in that text

For Example: "I love eating noodle" → **POSITIVE SENTIMENT** (Positive Emotion)

"I don't like studying" → **NEGATIVE SENTIMENT** (Negative Emotion)

What is dimABSA?

- Emotions/Sentiments can be classified in two ways:

  1. **Categorial Approach**: This means representing emotions as distinct and discrete classes or categories. Sentence can either be positive, negative or neutral.
     - "The burger was very tasty" → Positive
     - "The waiter was extremely rude" → Negative
     - "The food was okay" → Neutral

  2. **Dimensional Approach**: This means instead of having categories (like positive, negative and neutral), we can define emotions as numerical values on a ***valence-arousal plane***.

What is Valence-Arousal Plane?

Fig. 1. Two-dimensional valence-arousal space.
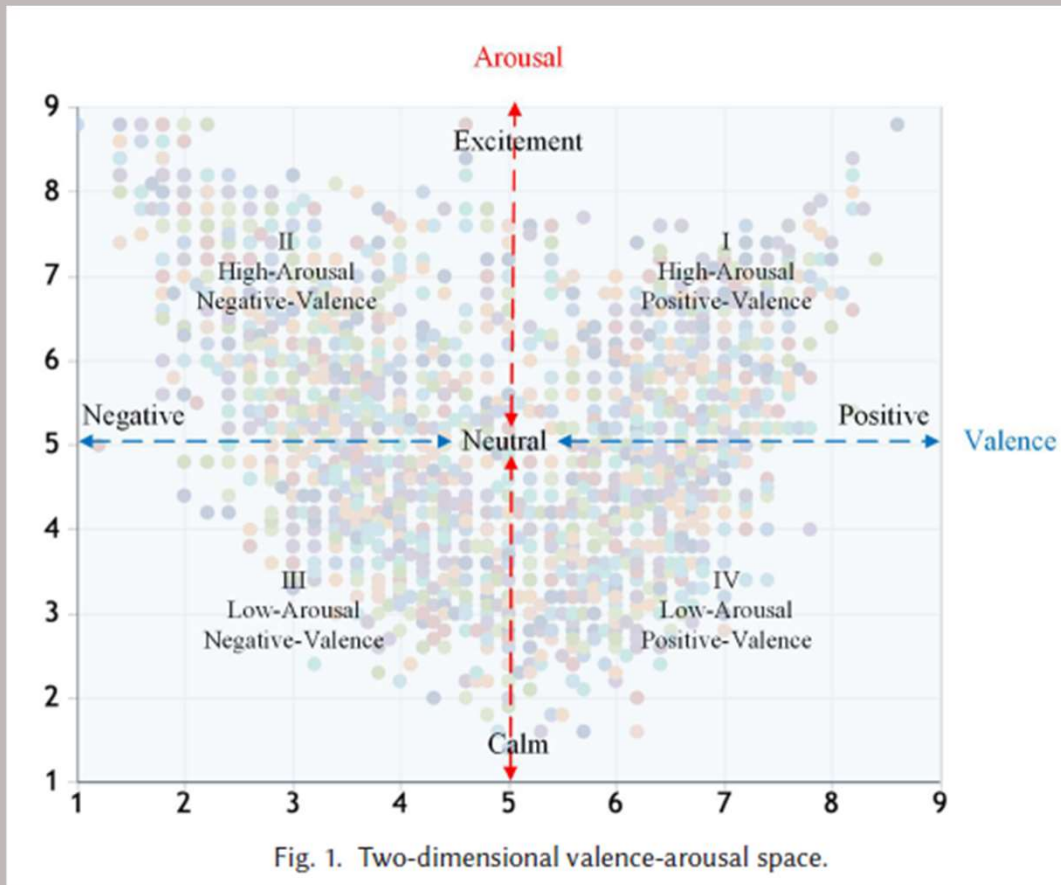
- It is a 2-D space/plane where the x-axis represents the "Valence" while the y-axis represents the "Arousal".

- 'Valence' measures how positive or negative an emotion is. 'Arousal' measures how calm or intense an emotion is.

- This 2-D space/plane is used to assign a valence-arousal rating to emotions.

- For Example:

Valence	Arousal	Emotion
Positive	High	Excitement
Positive	Low	Satisfaction
Negative	High	Anger
Negative	Low	Depression

What is dimABSA?

Thus, **Dimensional Sentiment Analysis** means studying emotions in text by assigning them a numerical value or position on the valence-arousal plane/space.

- Dimensional Aspect-Based Sentiment Analysis: This means instead of analyzing the sentiment/emotion of the overall sentence, we analyze the sentiment with respect to a specific aspect or subject.
- This means that Aspect-Based Sentiment Analysis helps analyze the sentiment of a particular aspect of the sentence rather than the whole sentence itself.

EXAMPLE:
Review: "The food was delicious, but the service was terrible."

- **Sentiment Analysis:**
  "Delicious" – Positive
  "Terrible" – Negative
  Overall sentiment of the text: Neutral

- **Aspect-Based Sentiment Analysis:**
  Aspect 1: "food" → "delicious" [Sentiment: positive, Dimensional Sentiment: 7.3 # 5.4]
  Aspect 2: "service" → "terrible" [Sentiment: negative , Dimensional Sentiment: 2.1 # 6.2]

dimABSA Methodology:

- Thus, first data was extracted and collected for use from Yelp Dataset.

- That data was then cleaned and filtered to be eligible for dimABSA.

- Now, the next task is to manually **annotate** the sentences and extract **quadruplets** from each sentence. This 'labelled' data would be used for training and testing the machine learning model for dimABSA.

- **QUADRUPLET = {Aspect , Aspect Category , Opinion , Valence#Arousal}**

Aspect Categories:

Appendix B. Restaurant Aspect Categories

Entity Labels	Attribute Labels
1. RESTAURANT	A. GENERAL
2. FOOD	B. PRICES
3. DRINKS	C. QUALITY
4. AMBIENCE	D. STYLE & OPTIONS
5. SERVICE	E. MISCELLANEOUS
6. LOCATION	

Aspect Category tells what type of aspect(subject) is being described and what attribute of the subject is being described.

For example:
1. "The drinks were absolutely refreshing"

Aspect: Drinks
Opinion: Absolutely Refreshing
Aspect-Category: Drinks#Quality

2. "The homemade pasta was fresh, and the service was quick too"

Aspect: Homemade Pasta, Service
Opinion: Fresh, Quick
Aspect Categories: Food#Quality, Service#General

dimABSA Triplets Examples:

- **Examples:**

A. "The food is good , but it takes a very long time to come out"

Aspect: ['food', 'food']

Opinion: ['good', 'very long time']

Aspect Category: ['Food#Quality', 'Service#General']

B. "Friendly , attentive staff"

Aspect: ['staff', 'staff']

Opinion: ['friendly', 'attentive']

Aspect Category: ['Service#Quality', 'Service#Quality']

dimABSA Triplets Examples:

C. "My absolute favorite cafe in the city"

Aspect: ['café']

Opinion: ['favorite']

Aspect Category: ['Restaurant#General']

D. "Great price for a filling breakfast"

Aspect: ['price', 'breakfast']

Opinion: ['great', 'filling']

Aspect Category: ['Price#General', 'Food#General']

dimABSA Triplets Examples:

C. "Great friendly atmosphere"

Aspect: ['atmosphere', 'atmosphere']

Opinion: ['great', 'friendly']

Aspect Category: ['Ambience#General', 'Ambience#General']

D. "Awesome location , good service is why I have been eating there for the past 15 years off and on"

Aspect: ['location', 'service']

Opinion: ['awesome', 'good']

Aspect Category: ['Location#General', 'Service#Quality']