

**What is the relation between sentiment analysis, natural language processing and machine learning?**

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[Pathan Karimkhan](https://www.quora.com/profile/Pathan-Karimkhan), Bigdata, NLP, Machine learning excite me a lot!

[Answered Oct 5, 2017](https://www.quora.com/What-is-the-relation-between-sentiment-analysis-natural-language-processing-and-machine-learning/answer/Pathan-Karimkhan) · Author has **231** answers and **873.8k** answer views

Let me explain the relation between Sentiment analysis, Machine learning, NLP using very simple image

Machine Learning and NLP are two children of AI, which works together and helps to solve many data problems.

**Natural language processing** (**NLP**) is a field of computer science, artificial intelligence and computational linguistics concerned with the interactions between computers and human (**natural**) languages, and, in particular, concerned with programming computers to fruitfully process large natural language corpora.

**Machine learning** is a core sub-area of artificial intelligence as it enables computers to get into a mode of self-**learning**without being explicitly programmed. When exposed to new data, computer programs, are enabled to learn, grow, change, and develop by themselves.

**Sentiment Analysis (Formal definition)** is the process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc. is positive, negative, or neutral.

There are mainly **three** approaches for performing the sentiment analysis ([Pathan Karimkhan's answer to How does sentiment analysis work, generally?](https://www.quora.com/How-does-sentiment-analysis-work-generally/answer/Pathan-Karimkhan))

1. Lexicon based - considers lexicon dictionary for identifying polarity of the text**(Purely NLP based)**
2. Machine learning based approach - Needs to develop classification model, which is trained using prelabeled dataset of positive, negative, neutral content.**(Combines concept of NLP and ML)**
3. Combined approach - Which uses lexicon dictionary along with pre-labelled data set for developing classification model. (**Combines approach 1 and approach 2)**

Now let me explain with the steps of sentiment analysis. You will get idea how NLP and ML used for the game. I have provided very basic steps one can drill deeper for better accuracy. ([Pathan Karimkhan's answer to I am a beginner in this field and want to do sentiment analysis on a given data set. Where is a step-by-step tutorial for the same?](https://www.quora.com/I-am-a-beginner-in-this-field-and-want-to-do-sentiment-analysis-on-a-given-data-set-Where-is-a-step-by-step-tutorial-for-the-same/answer/Pathan-Karimkhan))

1. Get terms - Reduce each review(text) to the list of words **(Using NLP Concepts of tokenization and ngraming)**
2. Filtering - Remove unnecessary words that will not add value for sentiment analysis – is, among, but, and, it, that **(NLP concepts of Stop words processing)**
3. BaseWord - Convert all inflections to their root word - fry, fries, fried -> fry**(NLP Concept of stemming and lemmatization)**
4. Negation detection - Identifying the negation context i.e not happy -> sad, not bad-> good**(Again using NLP concepts of token processing)**
5. Feature generations - Use the words thus extracted from a review as features to indicate the positiveness or negativeness of that review **(Use feature extraction algorithms Bag of word, TF-IDF, Count vectorizer etc which - NLP again helps here)**
6. Statistical Classifier - Train a machine learning classifier to predict positivity (Applying Machine Learning algorithms on features generated in previous steps to predict the polarity of the document)

So NLP helps machine to understand the text, from this understanding ML algorithms enables program to learn from historical text documents to predict the negative-positive-neutral polarity.

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[Michal Illich](https://www.quora.com/profile/Michal-Illich), founder of Wikidi

[Answered Aug 11, 2014](https://www.quora.com/What-is-the-relation-between-sentiment-analysis-natural-language-processing-and-machine-learning/answer/Michal-Illich) · Author has **417** answers and **762.2k** answer views

Machine learning is a part of artificial intelligence where your algorithms learn on (usually big) data. It subdivides into classification, regression, clustering and other disciplines.  
  
Natural language processing can use machine learning but it can be also engineered by hand.  
  
Sentiment analysis is a part of NLP. It usually uses machine learning (classification).  
  
I don't agree with Marcus that sentiment analysis the most widely implemented, practical application of NLP. For example stemming, spell checking, automatic synonym retrieval, phrase detection or fluency calculation are more imp...

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