

# Exploring Ethics based on Natural Language Programming

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**Abstract** - Exploring branch of knowledge dealing with different moral principles and the study of Natural Language Processing (NLP) to enrich the source of machine learning by which detection of human languages can be done by a system. Natural language processing is an area of research and application that explores how computers can be used to understand and manipulates natural language text or speech to do useful things. NLP is a way for computers to analyze, understand, and derive meaning from human language in a smart and useful way. By utilizing NLP, developers can organize and structure knowledge to perform tasks such as automatic summarization, translation, named entity recognition, relationship extraction, sentiment analysis, speech recognition, and topic segmentation.

**Key Words:** Natural Language Processing (NLP), Artificial Intelligence (AI), Natural Language Toolkit (NLTK)

## 1. INTRODUCTION

While natural language processing isn't a new invention, the technology is rapidly advancing thanks to an increased interest in Human - Machine system interactions, and the easily accessible more data, powerful system managing and enhanced algorithms. As a human, you may speak and write in English, Spanish or Chinese. But a computer's language - known as machine code or machine language - is largely incomprehensible to most people. At your device's lowest levels, communication occurs not with words but through millions of zeros and ones that produce logical actions. Indeed, programmers used punch cards to communicate with the first computers 70 years ago. This manual and arduous process was understood by a relatively small number of people. Now we can say, "Google, I'm getting bored tell me a joke," and a device playing music in your home will lower the volume and reply, "OK. I found one," in a humanlike voice. Then it adapts its algorithm to play that voice - and others like it - the next time you listen to that system. As mentioned above, natural language processing is a type of artificial intelligence that understands and analyzes the human language. It takes many forms, but at its end, the technology helps system machine to understand, and even communicate with human voice. But understanding NLP is not the easiest thing. It's a very advanced form of AI that's only recently become viable. That means that not only are we still learning about NLP but also it is difficult to grasp now also. NLP combines AI with computational linguistics

and computer science to process human or natural languages and speech. The process can be broken down into three parts.

### 1.1 Tasks of the Procedure

The first task of NLP is to understand the natural language received by the computer. The computer uses a built-in statistical model to perform a speech recognition routine that converts the natural language to a programming language. It does this by breaking down a recent speech it hears into tiny units, and then compares these units to previous units from a previous speech. The output or result in text format statistically determines the words and sentences that were most likely said. This first task is called the speech-to-text process.

The next task is called the part-of-speech (POS) tagging or word-category disambiguation. This process elementarily identifies words in their grammatical forms as nouns, verbs, adjectives, past tense, etc. using a set of lexicon rules coded into the computer. After these two processes, the computer probably now understands the meaning of the speech that was made.

The third step taken by an NLP is text-to-speech conversion. At this stage, the computer programming language is converted into an audible or textual format for the user. A financial news chatbot, for example, that is asked a question like "How is Google doing today?" will most likely scan online finance sites for Google stock, and may decide to select only information like price and volume as its reply.

There are some linguistics terminologies like morphology, syntax, semantics, Pragmatics;

**Morphology:** the structure of words. For instance, unusually can be thought of as composed of a prefix un-, a stem usual, and an affix -ly. Composed is compose plus the inflectional affix -ed: a spelling rule means we end up with composed rather than composed.

**Syntax:** the way words are used to form phrases. e.g., it is part of English syntax that a determiner such as the will come before a noun, and also that determiners are obligatory with certain singular nouns.

**Semantics - Compositional semantics** is the construction of meaning (generally expressed as logic) based on Syntax. This is contrasted to lexical semantics, i.e., the meaning of individual words.

**Pragmatics:** meaning in context.

## 1.2 NLP in context with Education

Natural Language processing has various applications for educational purpose. It is very significant to develop new software systems and advanced techniques in the educational settings. The major purpose of using NLP in educational setting is to bring improvement in the educational system by implementing efficient and effective policies, which can assist in utilizing advance technologies for the bringing improvement in the educational system. For example, application of NLP in education for e-learning is very significant approach, which assist in producing educational material with technological development. Another significance of NLP application is the participation of both teachers and students. There are a number of various electronic, online sources available in English language, which assists students and teachers to access materials. Apart from the convenience of availability of large number of online resources, another major concern is associated with the increase in use of blogs, Wikipedia, and unreliable resources. This requires intelligent automatic processing for preventing the use of such unreliable resources and promoting the use of authentic resources. Application of NLP in education is also effective for mining, information retrieval, and quality assessment.

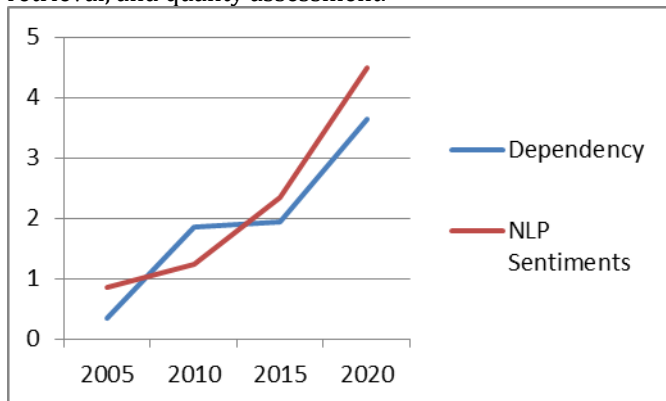


Chart -1: Sentimental Analysis of NLP acceptance worldwide

## 2. Diving Deeper in Processing Technique

Before the 1970s, most NLP researchers were concentrating on MT as an application. NLP was a very early application of CS and started about the same time as Chomsky was publishing his major works in formal linguistics (Chomsky an linguistics quickly became dominant, especially in the US). In the 1950s and early 1960s, ideas about formal grammar were being worked out in linguistics and algorithms for parsing natural language were being developed at the same time as algorithms for parsing programming languages. However, most linguists were uninterested in NLP and the approach that Chomsky developed turned out to be only somewhat indirectly useful for NLP.

NLP in the 1970s and first half of the 1980s were predominantly based on a paradigm where extensive linguistic and real-world knowledge was hand-coded. There was controversy about how much linguistic knowledge was necessary for processing, with some researchers downplaying syntax, in particular, in favor of world knowledge. NLP researchers were very much part of the AI community (especially in the US and the UK), and the debate that went on in AI about the use of logic vs. other meaning representations ('neat' vs. 'scruffy') also affected NLP. By the 1980s, several linguistic formalisms had appeared which were fully formally grounded and reasonably computationally tractable, and the linguistic/logical paradigm in NLP was firmly established. Unfortunately, this didn't lead to many useful systems, partly because many of the difficult problems (disambiguation etc.) were seen as somebody else's job (and mainstream AI was not developing adequate knowledge representation techniques) and partly because most researchers were concentrating on the 'agent-like' applications and neglecting the user aids. Although the symbolic, linguistically-based. Systems sometimes worked quite well as NLIDs, they proved to be of little use when it came to processing less restricted text, for applications such as IE. It also became apparent that lexical acquisition was a serious bottleneck for serious development of such systems. Statistical NLP became the most common paradigm in the 1990s, at least in the research community. Speech recognition had demonstrated that simple statistical techniques worked, given enough training data. NLP systems were built which required very limited hand-coded knowledge, apart from initial training material. Most applications were much shallower than the earlier NLIDs, but the switch to statistical NLP coincided with a change in US funding.

## 2.1 Revolutionized defining meaning of NLP

There are a number of different effective approaches, which assist in the process of e-learning and using web based current information related to the educational course and curriculum. E-learning applications and tools provide assistance for the learners to improve their education. Teachers also assist their students for enhancing their skills and knowledge for getting current information using the online resources, which assists in getting information from the online sources. NLP is also very effective for providing knowledge and information to the students for application of e-learning and NLP in understanding and dealing with the need of analyzing text. Understanding of text is based on the development of research-based analysis of the general and contextual learning.

Based on the research outcome, it is clear that students' output can be increased by implementing the NLP in the education. NLP is very effective approach for developing the understanding of students in the natural settings and assessing the information available from the various sources. The better understanding of information

and ability to access the information from large amount of data available on websites and other online sources can assist in generating and gathering information. Therefore, based on the results and effectiveness of NLP in the educational context, it is clear that NLP can be effectively applied for academic writing, assessment purposes, writing tests questions, and utilizing automatic writing systems for preparation of objective tests etc.

The application of NLP in education system is also very effective for analysis of errors in objective assessments and for the assessment of essays. Various linguistic approaches and tools can be utilized for analyzing the errors such as grammatical and stylistic errors. Teachers can easily mark these errors in the papers of students. There are various effective grammar checkers and evaluation sources, which assist in resolving the problems of dealing with the current process of learning. Teachers can use NLP for assessment of multiple-choice questions and analysis of grammatical pattern in the text that needed to be analyzed. The application of Standard e-learning method is very effective in order to ensure that student can efficiently apply the data in the e-learning system. This approach is not only affective for its application in assessment, but it is also effective for writing purposes such as writing material for digital libraries, websites, and various other sources.

### 3. Speech Understanding and Generation

The goal of *speech recognition systems* is to convert spoken words captured through a microphone to a written representation. *Speech understanding systems*, on the other hand, attempt to perform a more extensive (semantic, pragmatic) processing of the spoken utterance to “understand” what the user is saying, and act on what is being said – possibly by executing some command in an Underlying system such as a database, or modifying their particular knowledge of the world. Major issues in this area include speaker independence vs. dependence, continuous vs. discrete speech, complexity of the linguistic model, and handling of environment noise (Markowitz, 1996). *Speech generation* or *synthesis systems* deal with the opposite problem, namely to convert written representations of words to sounds. Compared to speech understanding, speech generation is considered by some to be a solved problem. This is because there exist several imperfect, yet effective speech synthesizers for many application domains and for a number of languages including English (American and British), Japanese, and Swedish (Kay *et al.*, 1994). Major techniques utilized for speech synthesis include *concatenation* of digital recordings, as in the output produced by US telephone directory assistance systems, *synthesis by rule*, where sounds are being generated electronically through the utilization of a grammar providing information on tone, intonation, and phonetic articulation effects, and *training of connectionist architectures*, as in the NET talk system mentioned.

(Preece 1994).

An interesting example of a system which combines speech recognition with speech generation is

Emily (Moscow 1994). Emily is an experimental speech understanding system that acts as a reading coach for children. It provides passages for reading, and listens making corrections whenever necessary – for instance it ignores minor mistakes such as false starts, or repeated words.

Reddy (1996) estimates that this project could save U.S. taxpayers over \$45 million if it could Reduce illiteracy in the U.S. by as little as 20%.

Examples of speech processing (recognition, understanding, and generation) systems that has been marketed include Apple’s Plain Talk, BBN’s Hark, Decipher, DEC talk, Dragon Dictate, IBM.

Voice Type, Kurzweil Voice, Listen, Naturally Speaking, Phonetic Engine (Merisel, 1994);

### 3.1 Complications Study

No simple mapping between sounds and words

- Variance in pronunciation due to gender, dialect, ...
  - Restriction to handle just one speaker
- Same sound corresponding to diff. words
  - e.g. bear, bare
- Finding gaps between words
- Recognizing Noise
  - “how to recognize speech”
  - “how to wreck a nice beach”

### 4. CONCLUSIONS

In conclusion, Natural Language Processing and its Educational Application provide a perfect solution to the various problems and barriers in the educational system, which result in affecting the academic progress and learning of the students. Language is one of the major concerns for the students. NLP with an effective approach for assisting the progress and improvement in the learning ability of students based on development and implementation of various effective tools, assist writing, learning, and assessment of texts, such as use of search engines, electronic resources and analysis of grammatical construction, syntax, sentence composition, etc. All these are the effective techniques, which can be utilized to develop the structural framework for analysis of texts.

### REFERENCES

- [1] Natural Language Processing and its Use in Education Dr. Khaled M. Alhawiti (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 5, No. 12, 2014

- [2] Natural Language Processing for Information Retrieval: the time is ripe (again) Matthew Lease  
Brown Laboratory for Linguistic Information Processing (BLLIP) Brown University Providence, RI USA
- [3] Deep Learning for Natural Language Processing  
Tianchuan DU, Vijay K. Shanker
- [4] K. Jiang and X. Lu, "Natural Language Processing and Its Applications in Machine Translation: A Diachronic Review," *2020 IEEE 3rd International Conference of Safe Production and Informatization (IICSPI)*, 2020.
- [5] J. Chai and A. Li, "Deep Learning in Natural Language Processing: A State-of-the-Art Survey," *2019 International Conference on Machine Learning and Cybernetics (ICMLC)*, 2019
- [6] Klaus Grief, R.K. Srivastava et al., "LSTM: A search space odyssey", *IEEE Transactions on Neural Networks and Learning Systems*, vol. 28, no. 10, pp. 2222-2232, 2017.
- [7] Colbert Ronan, J. Weston et al., "Natural language processing (almost) from scratch", *Journal of Machine Learning Research*, vol. 12, pp. 2493-2537, 2011.
- [8] Bahdanau Dzmitry, K. Cho and Y. Bengio, "Neural machine translation by jointly learning to align and translate", *ICLR*, 2015.

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