

A Review of Natural Language Processing and its Application in Education

IJSER

TABLE OF CONTENTS

| | |
|---|-----|
| Abstract..... | 564 |
| Introduction..... | 565 |
| BACKGROUND OF STUDY | 567 |
| Aims and Objectives..... | 568 |
| Research Methods..... | 569 |
| NLP and Educational Setting..... | 569 |
| Tools in NLP..... | 570 |
| What are the techniques used in NLP? | 571 |
| 1. Syntax | 571 |
| 2. Semantics | 571 |
| 3. Wrapping up..... | 572 |
| How does Natural Language Processing Works? | 572 |
| resulted and discussion | 574 |
| Optimizing structured objectives in Natural Language processing | 574 |
| Natural Language Processing and Education | 574 |
| Relationship between language and text..... | 575 |
| Implications of Natural Language Processing in Education..... | 576 |
| References..... | 579 |

ABSTRACT

Natural Language Processing (NLP) is one of the most developing methods that help to improve different learning environments. In addition, the implementation of NLP includes the promotion of training through the acquisition of trademarks as part of the instructions. Therefore, this research has conducted taking into account suitable approaches to answer various questions and problems in the education setup using the NLP application (Bell et al, 2018). Natural language processing provides an area in a wide range of regions identified with social and other conditions for learning a language. Therefore, NLP is one of the suitable methodologies for educators, employees, developers, trainers that help designing materials and request and evaluate procedures.

Processing of a natural language is usually included in the methodology with a huge degree of enlightenment, for example, science, historical foundations, e-learning, an assessment system and contributes to the achievement of positive results in other information conditions, such as schools, training institutes, colleges and universities. In addition, the article intends to study the general study of the language and its sentences in the educational procedure. The article shows how NLP can be used to improve the education system (Cai et al, 2016). The article pursues a primary qualitative methodology for the purpose of the research an interview was conducted with a teacher of an educational institute. Whereas data is gathered from articles and journals on recognition issues among teachers and students in, order to understand the settings due to obstacles in understanding the language. In addition, the results provide phonetic sufficiency tools, such as language, language structure, and scientific models, which are extremely useful in learning environments for learning.

Keywords—Natural Language Processing; educational system; e-learning; scientific studies; education application.

INTRODUCTION

Natural Language Processing (NLP) is an area of research and application that explores how human can use a computer to understand and control the essence of a typical language or conversation to do significant work. NLP researchers plan to collect information about how people understand the language and use it to create appropriate gadgets and methods that will allow computer structures to understand and control the characteristic dialects for completing tasks (Clark, 2019, Crossley, et al., (2017), Singh, et al., 2017). NLP funds are located in various areas of the executive branch, in particular, in the field of PC and computer science, semantics, number analysis, the structure of electrical and hardware, computational thinking and mechanical innovation, as well as in the science of reason. The use of NLP includes various areas of learning, for example, machine interpretation, processing and sketching of content in natural language, user interface, and multilingual and multilingual data recovery (CLIR), confirmation of discourse, artificial consciousness and basic structures (Tripathy, et al., 2015).

Moreover, one significant area of this application that is relatively new and not discussed in previous NLP researches indicates the expansion of this technology in the education sector. The concept of NLP arose in 1950 that was considered as the interaction between artificial intelligence and linguistics. Furthermore, Cai, (2016) and Almeida, et al., (2016) observed that NLP is very different from that called information retrieval (IR) that was based on high statistical scales, methods of indexing, efficient, and effective search for large volumes of text. According to Clark, (2019) IR has defined as a very innovative concept (Cope and Kalantzis, 2016). Also, NLP and IR have embraced a lot of context in various fields over a period. Thus, NLP currently shares implementation in several different areas, providing a variety of knowledge that requires modern researchers and developers related to the field to expand significantly their mental knowledge base (Huang, and Lu, 2015).

Furthermore, given the traditional trend, the literal machine translation from Russian into English was performed using homographs (Fishman, 2017). Theoretical analysis of grammars used in languages created various difficulties, creating a Backus-Naur notation (BNF). BNF is used to refer to grammatical free context (CFG). The specificity of the BNF language lies indecisiveness that decides that the general program language must be approved by the language code (Crossley et al, 2015). The “Standards” here are common imperatives, not the heuristics of the underlying

structures. According to Kohn., (2017) it has also emphasized those gradually prohibiting “regular” punctuation marks that are a prerequisite for regular expressions used to define the content search design (Verma, et al., 2015). The normal articulation sentence structure characterized was first supported by Ken Thompson's grip utility on UNIX.

Therefore, in 1970s Laxer parser generators, such as the Lex/yuck combination, are used for sentence structures. The laxer changes the contents into tokens whereas the parser approves the token grouping. Furthermore, Lexar / Parser generators greatly simplify the use of the programming language, individually accepting the usual articulation and BNF functions as information, and creating code and query tables that determine the choice of flexing/parsing (Donath et al, 2016). Although CFGs are hypothetically insufficient for a common language, they are often used for NLP application. Moreover, programming dialects are usually planned intentionally with exorbitant CFG variation, LALR syntax (LALR, Look-Ahead parser with left-to-right processing and output from right to left) to unravel the usage. Therefore, the LALR parser (1) checks the contents from left to right, processes the database (that is, collects complex projects from less complex ones) and uses a single token preview to select parsing parameters (Dahou, et al., 2016).

The Prologue language was originally introduced in 1970 to use NLP applications (Schubotz, et al., 2016). Its punctuation is especially suitable for constructing sentence structures, even though the simplest execution mode (parsing from top to bottom) the rules should be express in an unexpected way (that is, recursively to the right) from the rules proposed for yuck parsers (Dzikovska et al, 2016). Thus Parser from top to bottom is easier to implement than a basic level parser (they do not need to worry about generators), but they work much slower.

We have implemented several improvement strategies that are commonly used in NLP; most of them are sorted by boundary, probabilistic and perceptron-like methods (Islam, et al., 2017). In general, the focus on online strategies because of their significant quick favourable circumstances in contrast to calculations, for example, LBFGS or cluster libraries exponent gradient. Some researchers have pointed out the need for relevant research to facilitate multilingual or multilingual information retrieval, including multilingual text processing (Dzikovska et al, 2016). Natural Language Processing is recognized widely known as a language

that is adapted almost everywhere in the world. Furthermore, it has efficiently implemented in various languages as a successful route for improving the education system.

As the English language in most researched reflections that show, that it is important to use the general process of learning a language in the education system. However, NLP also commendable approach for improving the educational system of different countries. Regardless of this, there are various methodologies to improve social and education-setting NLP is the best methodology in what common language will be used to create NLP tools for promoting the instruction (Dzikovska et al, 2016). The usages of these devices are dependent on various viable methodologies to assist in the procedure school and higher education. Therefore, it needs the development of tools and techniques for improving the education system.

BACKGROUND OF THE STUDY

Natural language processing NLP is one of the leading factors related to the branch of science that is used for improving and developing the educational process. In addition, Natural Language Processing is a central point related to that part of science that emphasizes progress and improvement throughout learning (Fishman et al, 2017). Moreover, NLP provides hypothetical evidence to help establish procedures and successful methodologies to assist in logical learning using viable assumptions and methodologies. NLP can be adequately applied in learning to advance language learning and improve student achievement.

According to Russell., (2016) Preparing for the natural language helps create a viable learning process in the educational environment that helps to create logical methodologies that can help use computers and the Internet to develop learning. Furthermore, there are various computer programs and suitable language learning methods (Hemati et al, 2016). It depends on the use of a viable and effective process of learning a language in typical conditions. NLPs use a special language process and procedure to create compelling methodologies that help to achieve the best learning settings.

The methodology in NLP is increasingly centred on creating the basics of instructional programming and instructional procedures that can help use specific dialects for instruction, such as e-rater and Text Adapter. NLP product frameworks can recognize the process of learning a language in typical conditions (Hussein, 2018). Natural language teaching is also a compelling

methodology for creating a skilful organisation for monitoring the etymological contribution to general education settings using different words, sentences and messages. When processing a natural language, various syntactic directions and etymological methodologies are additionally used, for example, induction, illness, sentence structure times, semantic structure, dictionary, corpus, morphemes, times, etc. Therefore, all of these viable methodologies can be apply in educational institutions that can help students in better understanding of the curriculum.

Aims and Objectives

Aim

To review the NLP and its implications in education.

Objectives

To identify the relationship between natural language processing NLP and education setting.

IJSER

Research Methods

The research method used in the article is based on the primary qualitative methodology. Whereas the research strategy adopted for data collection is based on interviews conducted with the teachers of an educational institute. Furthermore, as various issues that are faced by teachers and student about understanding the languages because of change context. Using compelling etymological devices such as language, linguistic structure and printed examples are extremely convincing study and assessment of content (Kohn, 2017). However, research depends on primary qualitative methodology. Data collection strategy depends on collecting data from primary sources that are the interviewee that participated in the research and confirm to provide help in understanding the procedure of a natural language and its implementation in education. Furthermore, the research strategy for the literature review was based on the searching of keyword related to the topic on different online platforms like Google scholar etc.

NLP and Educational Setting

Numerous devices and methods in NLP help in training settings, for example, when working with test information, cases and other related semantics, which are viable for a language learning system (Kudliskis, 2019). The enterprise is incredibly creative; it provides endless data for translating and viewing the language. The accumulation of these monsters provides good information about the use of words that help improve the data and educational potential of elementary students.

Besides, various amazing procedures allow to observe examples of sentence structures and other semantic methodologies. Thus, NLP is another fantastic foundation for an assessment methodology that improves the ability of primary school children to see the contacts between different words and use of these words internet records to create a fortune (Kyle and Crossley, 2016). Thus, NLP is a useful way of thinking that allows students and teachers to use these words with great enthusiasm. The rating structure requires entering the correct data into the substance to go to the next level. Evaluation of NLP allows to investigate data on understudies and bring them in line with the requirements of the substance.

Tools in NLP

Turning to gadgets, NLP confirms its skills in many areas, such as examinations, information staff, e-learning, and training. In addition, the proximity of web scanners provides adequate information to search for information, but language prerequisites are a serious problem for the vast majority, which allows you to learn a language using electronic sources and online materials available on the Internet Liu et al, (2019), Crossley, et al., (2017). Natural language processing prepares additional, identified with an understanding of various practical etymological means, for example, syntactic promotion, language structure, writing sentences, etc. Using NLP in e-learning is an overwhelming strategy, especially its application in the field of learning. Processing a typical language can help people build up a typical understanding of the scientific and mental perspectives that do a significant job of mastering the language.

In addition, a typical language scheme can be implemented enough to guarantee the presence of various positive attributes of this method, for example, the subtleties of synchronous or non-parallel mode. Procedures for using NLP under various conditions require the use of an e-learning strategy or the use of various materials to obtain improvements for further development in various fields (Singh, et al., 2017). The system or strategy of this study also requires persuasive methods and the use of language resources to improve structure (Mann, 2017). Some countless tools and methods facilitate the use of language development, such as a catering company with a historical past, which can track and satisfy development needs in various fields. Using language tools also allows you to understand the essence, for example, to improve understanding of the material during observation, to promote the material and material of the saw.

Thus, NLP gadgets effectively help in the learning process, for example, locales, vehicles, special libraries, leading books, web chronicles and consistent materials. This is probably the best relationship that allows people to focus and explore more in the field of learning (Tripathy, et al., 2015). There are various amazing methods for performing NLP for educational purposes, for example, collecting and grouping various sources up to preparation. This can help identify certified sources and refrain from using confidential resources (Matthews, 2016). Another way to help language students is to allow groups of people to focus on course materials and topic content. This methodology depends on the consistency of information on the content of the

students' course; this method is taken from the NLP assessment system. For example, to create a revelation, you can use understudies that compare the content of insults with current data received from an online source.

What are the techniques used in NLP?

1. Syntax

The linguistic structure hints at the course of action of words in a sentence with the ultimate goal so that they portend well. NLP uses parsing to verify that a common language complies with linguistic recommendations (Norouzi et al, (2016), Almeida, et al., (2016). Computer calculations are very much helpful in providing linguistic recommendations to a set of words and providing a structures form to them. Here are some language structure procedures that you can use:

- **Lemmatization:** includes the reduction of various curved types of words into a single structure for easy learning.
- **Morphological separation:** it includes the distribution of words into separate units called morphemes.
- **Word segmentation:** includes the allocation of a huge amount of persistent content into separate blocks.
- **Parts of speech:** includes distinguishing grammatical form for each word.
- **Parsing:** includes parsing the proposed proposal.
- **Sentence breaking:** includes setting offer limits for a huge amount of content.
- **Stemming:** includes the division of arched words into their root structure.

2. Semantics

Semantic confirmation is one of the dangerous parts of natural language processing that has not yet been fully resolved Orasmaa et al, (2016); Huang, and Lu, (2015). This includes using pictures on a computer to understand the meanings of words and sentences. There are a couple of approaches in semantic research:

- Named Substance Confirmation (NER): includes identifying parts of the book that have displayed and grouped into predefined accumulations. As some examples of such meetings, include names of people, places and things.
- Word ambiguity: includes recommendations on the meaning of the word depending on specific conditions.
- Natural language age: includes the use of records to characterize semantic goals and transform them into different human languages.

3. Wrapping up

The language of processing characteristics includes the main job of maintaining connections between the machine and the person Pons et al, (2016); Verma, et al., (2015). As research in this area advances, we hope to see more advances that will make machines more penetrating in the perception and hailing a knowledge of the human language.

Have you used any NLP procedure to increase the usefulness of your application?

Do you have a request or comment?

Organized Goals in Natural Language

Processing a normal language is the main goal when working with the main applications:

- Google Translate that is one of the tools for learning the language.
- Personal related apps like OK Google, Siri, Cortana and Alexa.

How does Natural Language Processing Works?

NLP involves the use of computing to recognize and share a common language with the ultimate goal of deciding on the conversion of unstructured language information into a structure that computers can receive. At the time the content is provided, the computer will use the calculations to focus on the importance associated with each proposal and to receive basic information from them (Porcia et al, (2016); Dahou, et al., (2016). In some places, computers may neglect to understand the importance of the proposal, which leads to gloomy results. For example, a smart

episode occurred in the 1950s during the translation of specific words between English and Russian (Sokolov et al, 2016). Here is a scripture sentence that needs clarification:

“The spirit is willing, but the flesh is weak.”

The sentences that are resulted after translating it was as follow

“The vodka is good, but the meat is rotten.”

IJSER

RESULTS AND DISCUSSION

Theme#1: Optimizing structured objectives in Natural Language processing

Although the optimisation procedures in discourse and language training discussed in this article are created in the past with a small contribution from the optimisation wizards, circumstances change as information measures and the multifaceted nature of instruction execution continue to evolve (Robinson et al, 2016). Furthermore, the requirement for all the dominant optimisation methodologies is to foster synergies between the information-processing network (discourse/language training and wider AI, and the optimisation network on topics such as non-session strategies, semi-Newton methods (L-BFGS) calculation) and stochastic inclination.

As most of the interviewees respondent that *“it is expected that new challenges with optimisation be there because deep learning and various methods that are highly dependent on innovation in optimisation are sent with a discourse of queries and handling language issues”*.

Models of such coordinated efforts have just touched on the basics of discourse recognition using deep neural systems and various types of deep learning models, as well as in processing electronic languages. Even with the use of repetitive neural systems, this model is too new to consider the discussion in this article (Russell and Norvig, 2016; Schubotz, et al., 2016).

Theme#2: Natural Language Processing and Education

Improving new programming structures and moving structures in the learning environment are fantastically gigantic. The true explanation for using NLP for instructive reasons is to improve the learning base using useful and viable methods that can help use the creative foundation to improve the learning base (Salloum et al, 2017). For example, the use of NLP in e-learning is an abnormally important system that helps in creating material with mechanical improvement.

As one of the interviewees stated that

“Natural Language Processing (NLP) is an effective approach for bringing improvement in the educational setting. Implementing NLP involves initiating the process of learning through natural acquisition in the educational systems. It is based on effective approaches for providing a solution for various problems and issues in education”.

Also, another huge problem with the use of NLP is the help of two teachers and students; since various electronic sources in English help students and teachers to access the materials. Regardless of the guaranteed availability of colossal indexes of online resources, another important issue is the improvement of the used landmarks, Wikipedia and conflicting resources. This requires skilful individual processing to confirm the use of such tangled assets and support the use of genuine assets. The use of NLP in the territories additionally contributes to the extraction of minerals, the restoration of information and the assessment of quality.

Theme #3: Relationship between language and text

Burton Foods. The listed reports show that in these associations NLP is pushing for greater commitment to work, the inspiration for work and productivity. One of the key applications of NLP methods in hierarchical conditions determines the successful establishment of goals and systems to enhance the achievement of goals. Although the goal-setting strategies used in associations will usually subjectively organize (for example, the SMART goal), NLP is the only way to solve problems, and for example, five tactile spaces have constantly used in the right form (Sokolov et al, 2016; Almeida, et al., 2016). As a combination of body development methods as methods that help people imagine how an effectively realized goal can affect different parts of their lives. These unique NLP moments are understandable to improve objective possession and inspiration, as well as to cultivate progressively versatile mental procedures that are identified with objective execution.

NLP was also used by associations when sending documents on self-government, representation, organisation, surveys, group formation, initiative and self-esteem. As the criticism of the seeker indicates, it has compared to the assumption by NLP that "the importance of correspondence is the reaction you receive." Also, reflection hints at the NLP technique, which includes a thorough study of emotional involvement in a particular business environment. These philosophical methodologies and the explicit abilities of NLP to transform organized learning into applied abilities by encouraging casual learning are fundamental to human development (HRD), and yet the same number of associations are still energetically orientating the improvement of their employees (van der Meer, 2016). Around formal learning - Also, a translation methodology

containing an interpretation of results based on auxiliary sources demonstrates that essence and development are useful associations.

As most of the interviewee responded that *“NLP is an emerging field that not only save time but also makes you learn new and interesting things at a much convenient and an easy way so there is very important and useful relationship of NLP and education”*.

The regular process of providing language support along with inspiration from teachers can be a significant hot spot for improving student academic procedures. Teachers and students can pay attention to procedures that are well suited for using the language for educational purposes. For example, studies show that setting up an exam is unthinkable without an understanding of the content. As indicated by Bell, (2018) and Tripathy, et al., (2015), the implementation of the normal language of preparation for learning shows that teachers and teachers can use the NLP approach to structure and organize the curriculum.

It can also help faculty use the same key methodology for learning and understanding. Creators of scriptures and substances can use this methodology to delay and encode data for understudies, and understudies use the same methodology and phonetic part to decrypt the content. Thus, the information about the usual language procedure is compelling for teachers, teachers, writers and students to better learn and understand the essence, as well as improve their ability to compose.

Theme #4: Implications of Natural Language Processing in Education

Various unmistakable and reasonable methods help the e-learning process and use the electronic current information described in the curriculum and educational program. E-learning apps and devices help students improve their learning. Understanding the essence is base on promoting an intelligence-based assessment of general and important training. In light of the consequences of the exam, it becomes apparent that can be effectively student profitability can be enhanced by updating NLP in the learning process (Westerling et al, 2016). NLP is a convincing philosophy of structural understanding of how to understand general conditions and consider the information available from various sources. Following this, taking into account the results and the mandatory nature of NLP for training purposes, it is obvious that NLP used for the logical part, for evaluation purposes, for drawing up test questions and using the product structure to prepare for objective tests, etc.

As most of the interviewee respondent *“it becomes apparent that can be effectively student profitability can be enhanced by updating NLP in the learning process NLP is a convincing philosophy of structural understanding of how to understand general conditions and consider the information available from various sources that are very useful in education”*.

Similarly using NLP as a learning function is also important to account for gross errors in objective assessments and viability assessments. Various etymological philosophies and gadgets, such as syntactic and complex errors, can be used to recognize gross errors. Teachers can, without a doubt, check these errors in backup archives (Yim et al, 2016). There are various compelling language structure validation tools and assessment sources that can help you cope with ongoing learning. Teachers can use NLP to evaluate numerous questions about the device and focus the semantic model on the object that needs to be separated (Islam, et al., 2017). Using standard e-learning strategies has been fruitful, so the training staff can apply the data in e-learning. This strategy is not loaded with applications for its application in evaluation, but it is also successful for setting goals, for example, for organizing materials for automated libraries, sites and various sources.

IJSER

CONCLUSION AND RECOMMENDATIONS

The final explanations that can be drawn from the aforementioned exchange suggest that natural language processing and its use in teaching provide an ideal answer to various problems and obstacles in the learning environment that affect self-realisation and learning. Also, language is one of the main issues for students. Along with this, NLP with the help of a suitable system develops and improves the teaching abilities of students depending on the improvement and implementation of various incredible gadgets that collect study and evaluate, for example, students' work using web files, electronic resources. Also, research, syntactic promotion. Language structure, consolidation of recommendations, etc.

Therefore, all this is a powerful foundation that could be used to create an auxiliary structure for research work. The use of accentuation, language structure and sentence association can be successfully used inside a system of phonetic programming devices, for example, syntactic controllers, which save time and help two teachers and students. Thus, it is important to create an effective system from a social and social point of view. Implementing NLP is also useful when using the e-learning method to understand and profit using data available from electronic sources. It is also possible to use this article for the future, which may help various scholars perceive an unusual language model. Further studies may be a plan to determine its effect on individual recognition, understanding of the conditions and capabilities of NLP, recorded for both print and evaluation.

REFERENCES

- Almeida, T.A., Silva, T.P., Santos, I. and Hidalgo, J.M.G., 2016. Text normalization and semantic indexing to enhance instant messaging and SMS spam filtering. *Knowledge-Based Systems*, 108, pp.25-32.
- Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*. Oxford university press.
- Cai, T., Giannopoulos, A. A., Yu, S., Kelli, T., Ripley, B., Kumamaru, K. K., ... & Mitsouras, D. (2016). Natural language processing technologies in radiology research and clinical applications. *Radiographics*, 36(1), 176-191.
- Clark, H. H. (2019). *Semantics and comprehension* (Vol. 187). Walter de Gruyter GmbH & Co KG.
- Cope, B., & Kalantzis, M. (2016). Big data comes to school: Implications for learning, assessment, and research. *AERA Open*, 2(2), 2332858416641907.
- Crossley, S., McNamara, D. S., Baker, R., Wang, Y., Paquette, L., Barnes, T., & Bergner, Y. (2015). Language to Completion: Success in an Educational Data Mining Massive Open Online Class. *International Educational Data Mining Society*.
- Crossley, S.A., Skalicky, S., Dascalu, M., McNamara, D.S. and Kyle, K., 2017. Predicting text comprehension, processing, and familiarity in adult readers: New approaches to readability formulas. *Discourse Processes*, 54(5-6), pp.340-359.
- Dahou, A., Xiong, S., Zhou, J., Haddoud, M.H. and Duan, P., 2016, December. Word embeddings and convolutional neural network for arabic sentiment classification. In *Proceedings of coling 2016, the 26th international conference on computational linguistics: Technical papers* (pp. 2418-2427).
- Donath, C., Baier, D., Graessel, E., & Hillemacher, T. (2016). Substance consumption in adolescents with and without an immigration background: a representative study—What part of an immigration background is protective against binge drinking?. *BMC public health*, 16(1), 1157.

- Dzikovska, M. O., Nielsen, R. D., & Leacock, C. (2016). The joint student response analysis and recognizing textual entailment challenge: making sense of student responses in educational applications. *Language Resources and Evaluation*, 50(1), 67-93.
- Fishman, J. A. (2017). Language and ethnicity: The view from within. *The handbook of sociolinguistics*, 327-343.
- Hemati, W., Uslu, T., & Mehler, A. (2016, December). TextImager: a Distributed UIMA-based System for NLP. In *Proceedings of COLING 2016, the 26th International Conference on Computational Linguistics: System Demonstrations* (pp. 59-63).
- Huang, C.C. and Lu, Z., 2015. Community challenges in biomedical text mining over 10 years: success, failure and the future. *Briefings in bioinformatics*, 17(1), pp.132-144.
- Hussein, D. M. E. D. M. (2018). A survey on sentiment analysis challenges. *Journal of King Saud University-Engineering Sciences*, 30(4), 330-338.
- Islam, N., Islam, Z. and Noor, N., 2017. A survey on optical character recognition system. *arXiv preprint arXiv:1710.05703*.
- Kohn, H. (2017). *The idea of nationalism: A study in its origins and background*. Routledge.
- Kudliskis, V. (2019). Coaching in an Educational Setting Utilizing “Techniques of Change”: Enhancing Engagement with Learning in a Post-16 Educational Setting. *Educational Process: International Journal*, 8(1), 7.
- Kyle, K., & Crossley, S. (2016). The relationship between lexical sophistication and independent and source-based writing. *Journal of Second Language Writing*, 34, 12-24.
- Liu, S., Bhowmick, S. S., Zhang, W., Wang, S., Huang, W., & Joty, S. (2019, June). NEURON: Query Execution Plan Meets Natural Language Processing For Augmenting DB Education. In *Proceedings of the 2019 International Conference on Management of Data* (pp. 1953-1956). ACM.
- Mann, I. (2017). *Hacking the human: social engineering techniques and security countermeasures*. Routledge.

- Matthews, C. (2016). *An introduction to natural language processing through Prolog*. Routledge.
- Norouzi, M., Bengio, S., Jaitly, N., Schuster, M., Wu, Y., & Schuurmans, D. (2016). Reward augmented maximum likelihood for neural structured prediction. In *Advances In Neural Information Processing Systems* (pp. 1723-1731).
- Orasmaa, S., Petmanson, T., Tkachenko, A., Laur, S., & Kaalep, H. J. (2016, May). Estate-NLP toolkit for Estonian. In *Proceedings of the Tenth International Conference on Language Resources and Evaluation (LREC 2016)* (pp. 2460-2466).
- Pons, E., Braun, L. M., Hunink, M. M., & Kors, J. A. (2016). Natural language processing in radiology: a systematic review. *Radiology*, 279(2), 329-343.
- Poria, S., Cambria, E., Howard, N., Huang, G. B., & Hussain, A. (2016). Fusing audio, visual and textual clues for sentiment analysis from multimodal content. *Neurocomputing*, 174, 50-59.
- Robinson, C., Yeomans, M., Reich, J., Hulleman, C., & Gehlbach, H. (2016, April). Forecasting student achievement in MOOCs with natural language processing. In *Proceedings of the sixth international conference on learning analytics & knowledge* (pp. 383-387). ACM.
- Russell, S. J., & Norvig, P. (2016). *Artificial intelligence: a modern approach*. Malaysia; Pearson Education Limited.
- Salloum, S. A., Al-Emran, M., Monem, A. A., & Shaalan, K. (2017). A survey of text mining in social media: facebook and twitter perspectives. *Adv. Sci. Technol. Eng. Syst. J*, 2(1), 127-133.
- Schubotz, M., Grigorev, A., Leich, M., Cohl, H.S., Meuschke, N., Gipp, B., Youssef, A.S. and Markl, V., 2016, July. Semantification of identifiers in mathematics for better math information retrieval. In *Proceedings of the 39th International ACM SIGIR conference on Research and Development in Information Retrieval* (pp. 135-144). ACM.
- Singh, J.P., Irani, S., Rana, N.P., Dwivedi, Y.K., Saumya, S. and Roy, P.K., 2017. Predicting the “helpfulness” of online consumer reviews. *Journal of Business Research*, 70, pp.346-355.

- Sokolov, A., Kreutzer, J., Riezler, S., & Lo, C. (2016). Stochastic structured prediction under bandit feedback. In *Advances in Neural Information Processing Systems* (pp. 1489-1497).
- Tripathy, A., Agrawal, A. and Rath, S.K., 2015. Classification of Sentimental Reviews Using Machine Learning Techniques. *Procedia Computer Science*, 57, pp.821-829.
- van der Meer, D. (2016). Wrapping up a century of splashes. *Journal of fluid mechanics*, 800, 1-4.
- Verma, R., Shashidhar, N.K. and Hossain, N., Narasimha Shashidhar, 2015. *Automatic phishing email detection based on natural language processing techniques*. U.S. Patent Application 14/015,524.
- Westerling, A., Dencik, L., & Andersen, H. H. (2016, August). Family life in transition—a longitudinal study of family life in Denmark: Background and methodology. In *8th Congress of the European Society on Family Relations (ESFR) Changing Family Relations—Gender and Generations August 31-September 3, 2016, TU Dortmund University, Germany*.
- Yim, W. W., Yetisgen, M., Harris, W. P., & Kwan, S. W. (2016). Natural language processing in oncology: a review. *JAMA oncology*, 2(6), 797-804.
- Yin, W., Kann, K., Yu, M., & Schütze, H. (2017). Comparative study of CNN and RNN for natural language processing. *arXiv preprint arXiv:1702.01923*.

INTERVIEW TRANSCRIPT

Interviewer: To what extent you think that NLP has been adopted in different sector of the world

Interviewee: *Well Natural Language Processing (NLP) is designed for understanding and analyzing the natural languages automatic way and export data or possible require information from those available data. NLP has some define algorithm which helps mainly on machine learning. This kind of machine learning algorithm actually helps for understanding analyzing some of the natural languages.*

Interviewer: How NLP and education can build a relationship in the current education system?

Interviewee: *As NLP is an emerging field that not only save time but also makes you to learn new and interesting things at a much convenient and an easy way so there is very important and usefull relationship of NLP and education.*

Interviewer: what is the impact of NLP technology on education

Interviewee: *Hmmm as, it becomes apparent that can be effectively student profitability can be enhanced by updating NLP in the learning process NLP is a convincing philosophy of structural understanding of how to understand general conditions and consider the information available from various sources that is very useful in education*

Interviewer: what do you thinks was traditional education system was much effective or does NLP implemented education system is more beneficial?

Interviewee: *Yeah as it is very prominent that the old school system of paper and pen that only make people to learn through writing was effective but comparing it with the current trend so NLP is more beneficial according to me.*

Interviewer: how does an NLP objective are useful in education system of schools?

Interviewee: *As Natural Language Processing (NLP) is an effective approach for bringing improvement in educational setting. Implementing NLP involves initiating the process of learning through the natural acquisition in the educational systems. It is based on effective approaches for providing a solution for various problems and issues in education.*

Interviewer: .what benefit does it gives to teaches as well as student in learning text and languages?

Interviewee: *Ahan using NLP as a learning function is also important to account for gross errors in objective assessments and viability assessments. Various etymological philosophies and gadgets, such as syntactic and complex errors, can be used to recognize gross errors. Teachers can, without a doubt, check these errors in backup archives*

| Open Coding | Axial Coding | Selective coding |
|---|---|---|
| 1. NLP has been adopted in different sector | NLP is very useful tool for learning languages. | Optimizing structured objectives in Natural Language processing |
| 2. NLP provides benefits to teachers as well as students. | It's easy to learn different languages. | Natural Language Processing and Education |
| 3. Education can build a relationship in the current education system | NLP helps to learn language and text | Relationship between language and text |
| 3. NLP objective are useful in education system of schools | Nlp is effective tool for learning text and language. | Implications of Natural Language Processing in Education |