| RESEARCH ARTICLE

A Computational Linguistic and Stylistic Exploration of Natural Language Processing in Replacing a Human's Career in the Future

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| ABSTRACT

This paper aims to examine the integration of computational linguistics and stylistics, focusing on two primary objectives. The first objective is to determine if current technology can develop a program capable of detecting and analyzing the overall emotion in texts, potentially replacing the work of emotive stylisticians. The second objective is to assess the impact of AI on the telecommunications industry through a questionnaire survey. Two main methods were employed for data analysis. First, a software program was developed to perform sentiment analysis on selected novels. After processing each novel, the program produced a chart containing the words that have emotional value and their frequencies. Afterward, the software was coded to take the average of all the words that relate to emotions (positive, neutral, and negative) and detect the dominant sentiment among the three selected novels. The second method involved a questionnaire distributed to participants of an international telecommunications company, exploring AI's influence on their daily work. The results indicate that current technology cannot fully automate the role of emotive stylisticians due to reliability issues. Additionally, the survey suggests significant upcoming changes in the telecommunications industry due to AI's growing influence.

1. Introduction

Artificial intelligence (AI) has eliminated redundant tasks in many industries, including aviation, Insurance, art, healthcare, telecommunications, oil, gas, energy, and others. All of these used to take hundreds of hours to be executed by humans but are now automated by computer software programs. AI has benefited many industries; however, it has come at the cost of taking over the careers of those who manually executed those tasks before. A vivid example of this in the language industry is language translation, done solely by humans back in the day. Even with the creation of translation applications, human translation skills were still better since the computer translator made various grammatical and pragmatic errors when translating. However, in recent years, human translation job opportunities have decreased because of language translation applications, which have advanced on many critical levels, including the correct forms of syntax, semantics, and pragmatics. Logically, it should be considered that AI could completely replace all human careers since it has proven itself to be a more useful and efficient tool than humans in the tasks it has replaced. Hence, one of the aims of this paper is to create AI software that works on sentiment analysis techniques to substitute the work of emotive stylisticians (those who interpret emotional words in the text). Another aim is to observe this career replacement by AI experts practically in an industry such as telecommunications companies. Thus, the research questions aim to address the following:

1. Will AI substitute all human careers in the future?
2. How can sentiment analysis (SA) substitute the work of emotive stylisticians?

3.   What impact has AI had on telecommunication companies?

Accordingly, it has been hypothesized that the sentiment analysis technique of natural language processing (hence NLP) can be used to detect emotions in a text. Theoretically, it would be able to replace the work of emotive stylisticians (stylisticians who analyze the emotional words of the text). In regards to telecommunications, AI is critical for advances in the industry. Hence, the reason why it can be hypothesized that telecommunications technologies could be greatly impacted by AI in the near future.

The research scope is restricted to the linkage between computer science and linguistics which shows how computers help eliminate redundant human tasks via AI. Although AI is a broad term with many different applications in different disciplines, the focus of this research is the use of AI in NLP. AI is related to two fields, namely, science and engineering. The engineering part of this paper is to make a program through language programming to compose software that detects and analyzes emotional sentiments in the chosen texts.

2. Theoretical Background

In this section, the theoretical framework related to computational linguistics with notions such as AI, NLP, and SA connected with data analysis has been introduced.

2.1 Computational Linguistics

Computational Linguistics refers to the study of AI systems that can produce and interpret natural language. It is the organization of systems and the development of algorithms for their many components. Although research in computational linguistics has a wide range of goals, one of its main drivers has always been the creation of rather useful tools that use natural language (Grishman, 1986). The purpose of studying computational linguistics is to help individuals in their daily communication lives with useful applications such as chatbots, detecting unwanted online content, automated text translation, and speech recognition in programs such as Amazon's Alexa. Creating an application for computational linguistics requires an intricate process of maintaining complex models to ease individuals' lives.

2.2 Natural Language Processing (NLP)

NLP is a range of conceptually driven computational techniques for analysing and processing natural human communication data. It combines linguistics and computer science to achieve human-like language analysis and the production of tasks or applications (Liddy, 2001). NLP is an umbrella term that covers many subfields that can be categorized into three main segments: text processing, speech recognition, and speech synthesis, as explained below. People transfer immense amounts of communication data daily. Data analysts utilize this information and give it to machines, which can have human-like linguistic behaviors through exploiting AI techniques. As a result of this process, machines can perform redundant tasks to save individuals power, time, and effort. NLP provides individuals with benefits in the following tasks: email filters, smart assistants, search results, predictive text, language translation, digital phone calls, auto-correct, and others.

2.2.1 Text Processing

Text processing can be defined as the act of collecting textual data and doing things with it. These could involve reformatting it, extracting smaller bits of information, programmatically altering the material's substance, or carrying out calculations that rely on textual data (Mertz, 2003). Chatbots are one of the most recognized examples of text processing in NLP. Chatbots are created and programmed using various machine-learning methods. These machine-learning approaches rely on many gigabytes of data gathered through interpersonal interactions.

2.2.2 Speech Recognition

According to Gaikwad, the goal of speech recognition includes the machine's capability to be able to "hear", "understand", and "act upon" spoken information (Gaikwad, Gawali, B & Yannawar, 2010). The earliest speech recognition systems have gone through four stages to analyze and recognize information about the speaker's identity: analyzing, extracting features, modeling, and testing. Many vivid examples of speech recognition have been encountered daily, such as Google's speech-to-text engine and voice assistants.

2.2.3 Speech Synthesis

Speech synthesis refers to a computer's tasks to perform three jobs: the process of reading, the process of speaking, and the issues involved in getting computers (as opposed to humans) to carry this out. According to Taylor (2009). speech synthesis can be called text-to-speech (TTS). Even if the latter strongly correlates with speech recognition, the two notions should not be mixed, since the goal of speech recognition is to analyze natural speech and turn it into text, whereas the goal of TTS is to convert written text into speech. It is crucial to notice that TTS is not misunderstood for recorded audio playback since TTS is speech that

a computer generates from texts. Everyone has inevitably encountered a form of TTS in their lives, such as the automated speech response on telephone systems, as well as using TTS as a solution to assist disabled patients.

2.3 Artificial Intelligence (AI)

As mentioned above, AI can be associated with science and engineering. The engineering goal is to solve problems that humans encounter in the real world using AI as a bundle of techniques for representing knowledge, using that knowledge, and assembling systems. However, the scientific goal of AI is to identify ideologies about representing knowledge, using that knowledge, and assembling systems to explain various sorts of intelligence (Winston, (1992). McCarthy states that:

Artificial intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to [biologically observable methods (McCarthy, 2007).

In the next section, SA as an analytical approach will be introduced.

2.4 Sentiment Analysis (SA)

SA is commonly applied to text data to assist organizations in monitoring brand and product sentiment in consumer feedback to comprehend customers' demands. It is strongly related to text mining, NLP, and computational linguistics as a research area. One of the applications of SA is social media monitoring. More than 3.5 billion people regularly use social media, which represents 45% of the global population. Over 500,000 Tweets and 510,000 Facebook comments are posted by consumers every minute, and many of these communications offer insightful information for businesses about how customers feel about particular goods, services, and brands (Mejova, 2009). Businessmen can use SA to mine this data and extract the emotions that drive social media conversations to comprehend how and why users discussi certain products or topics. Some SA programs detect sentiment contextually by interpreting the whole text. The selected program used in the analysis operates on a word level. In this paper, the working definition of sentiment is that: *the sole emotions extracted through the lexical categories of adjectives and nouns that the program detects in the selected texts as an emotion to later filter and decide if they have positive, negative, or neutral effects*.

3. Methodology

This section introduces how the data is collected and the program created for SA. Two methods have been used: the first is the creation of a software program that processes and interprets any piece of written data in an SA scope, for which three novels have been chosen to do the test. The second method is a questionnaire in which a selected set of participants worked for an international telecommunications company in connection with AI. The tools and techniques applied to create the best-fitting formula for the previously mentioned objectives have also been presented.

3.1 Data collection

In collecting the data, two main techniques have been used to gather the relevant data needed to reveal how AI works and reach a conclusion for the main research questions, as follows: Firstly, a program has been created using NLP techniques to detect and analyse sentiment in the selected novels that are mentioned in detail in Section 3.3. Secondly, a questionnaire has been prepared for an international telecommunications company regarding AI and the possibility of job replacements in the future.

3.1.1 Program Creation for Sentiment Analysis (SA) and Its Use

One of the methods has been done via the programming language Python; some extracted code lines from Git Hub have been written. This is a website that programmers use to write and share code. The lines of code have been written in a program called PyCharm, which is a software application that assists programmers in efficiently developing software code. Through the code, the researchers ultimately ordered the computer to run through various tasks to analyse and detect the emotional words in the selected texts. The following steps have been taken:

1. A software program was coded to clean the text it is given by reformatting it to turn all uppercase letters into lowercase and remove all punctuation.

2. The program was coded to search any text it is given for words that indicate elements of emotion, for example, if it came across the words *happy, sad,* etc., the program would extract them. Afterward, the program would analyse the text sentimentally by using a model called Natural Language Toolkit (NLTK). This toolkit is a package that was created by programmers for NLP and its use is to detect sentiment by classifying words such as *happy* and *sad* to indicate a positive and negative sentiment, respectively. If the word indicates neither positivity nor negativity, it would be a neutral sentiment.

3. The program creates graphs showing all extracted words that indicate emotional feelings and the frequency of each word that has occurred.

4. Finally, the sentiment analyser takes all the sentiments (positive, negative, and neutral) and extracts the average of all emotional sentiments to detect the dominant ones.

3.1.2 Natural Language Possessing (NLP) Program: A Supportive Tool Used by Stylisticians

The purpose of this program was to ultimately show a human job title in contrast to its artificial form, which was done through a computer program. In this section, the researchers have shown a stylistician's work done through NLP. A stylistician is a person who conducts a linguistic and tonal analysis of a text. Since the tone and overall sentiment of a text are crucial in stylistic analysis, the researchers have decided to run various novels in the NLP program that was previously created to detect the overall sentiment of the story and, consequently, do a stylistic analysis on the selected novels.

3.2 Questionnaire

In this section, a questionnaire has been prepared to address five questions and given to five participants. Each participant has been given a form that contains five questions. This questionnaire aims to reach an answer to the research questions related to a telecommunications company. Telecommunication is used to exchange information over significant distances depending on electronic tools. Examples of telecommunication include applications such as telephone, television, and radio that users encounter daily.

Furthermore, telecommunication is a tool of communication with the assistance of technology, which has a vital role in this research area since it contains many tools used in the language industry. The questionnaire consists of only five questions given to five participants because a program has already been used for this research. However, a questionnaire was deemed important for further information gathering. Contact had been made between the researchers and one of the head managers of Asiacell (an international telecommunications company). Afterward, a date has been arranged for the meeting to be circulated among the five selected participants who have had significant roles in creating the software, which has been important to answer regarding AI. A questionnaire was, therefore, conducted to be presented to the telecommunications company for possible answers to the following prepared questions:

Q1. Which of these human career paths are now substituted by AI operating systems?

      a. Customer Service   b. Contract Preparation

      c. Finance Management   d. Sales Agent

Q2. Which new job titles have occurred and which were not vacant before?

      a. Cyber Security   b. Data Scientist

      c. UI UX designers   d. Data Warehouse Management

Q3. How likely is it that AI will substitute for current tasks presently run by humans?

    a. extremely likely   b. slightly likely

    c. neutral   d. to some extent difficult   e. extremely difficult

Q4. Which of these fields has AI benefitted telecommunications companies by eliminating redundant tasks?

    a. Customer Service   b. Contract Preparation

    c. Finance Management   d. Sales Agent

Q5. How can AI easily substitute all human-operated tasks in the future? Why?

    a. extremely easy   b. slightly easy

    c. neutral   d. to some extent difficult   e. extremely difficult

3.3 Data Selection

The selected novels for the NLP program method were *The Great Gatsby* by F. Scott Fitzgerald, *To Kill a Mockingbird* by Harper Lee, and *The Book Thief* by Markus Zusak. After gathering the online forms of each novel, each of the selected texts has been run through the NLP program and the emotions referred have been extracted.

The following abbreviations have been used in the paper: Artificial Intelligence (AI), Natural Language Processing (NLA), text-to-speech (TTS), and Natural Language Toolkit (NLTK).

4. Discussion and Analysis

The results obtained by the software program after running each of the selected novels, and the answers to the conducted questionnaire from the participants in Asiacell have been introduced below.

4.1 SA and the Selected Novels

After running the entirety of the selected novels through the program, the software wrote down all the words along with the number of times each word was repeated in each of the novels. Afterward, the average of all emotions was taken by the program to indicate the dominant sentiment emotions in each novel.

4.1.1 Sentiment Analysis of Fitzgerald's *The Great Gatsby*

Scott Fitzgerald wrote *The Great Gatsby*, a story about Jay Gatsby, a man who plans his entire existence around his desire to reunite with Daisy Buchanan, the woman he fell in love with but lost five years earlier. Gatsby's journey takes him from poverty to fortune, into his beloved's arms, and ultimately to death. A great work of American literature, *The Great Gatsby*, was first published in 1925. It is a book of success and sorrow praised for the unusual way Fitzgerald could portray a cross-section of American culture. The program detected the emotions for *The Great Gatsby* along with the number of times each word has been used as follows:

(happy': 26, 'sad': 21, 'fearful': 15, 'attracted': 14, 'angry': 12, 'attached': 7, 'powerless': 7, 'hated': 7, 'fearless': 5, 'adequate': 5, 'surprise': 5, ' loved': 4, 'esteemed': 4, 'alone': 4, 'cheated': 3, 'embarrassed': 3, 'entitled': 3, 'singled out': 3, 'anxious': 3, 'bored': 2, 'apathetic': 2, 'obsessed': 2, 'focused': 2, 'ecstatic': 2, 'lost': 2, 'independent': 2, 'average': 1,' belittled': 1, 'demoralized': 1, 'free': 1, 'lustful': 1, 'derailed': 1) as shown in Figure (1). Ultimately, the program detected that the dominant sentiment for *The Great Gatsby* was positive.

Figure (1) SA of Fitzgerald's *The Great Gatsby*

4.1.2 Sentiment Analysis of Lee's *To Kill a Mockingbird*
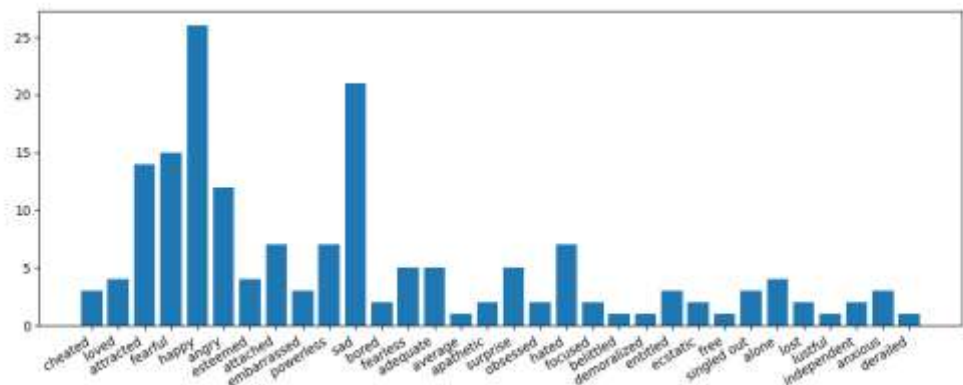
Harper Lee, an American author, published her book To Kill a Mockingbird in 1960. It is one of the most often assigned novels in American schools and has sold more than 40 million copies worldwide after being translated into more than 40 different languages. It received a Pulitzer Prize in 1961. The book received awards for how it handled a young child in introducing racism and discrimination in the American South. The list of emotions and their occurrences has been detected in the program as follows: ('sad': 25, 'happy': 25, 'fearful': 20, 'angry': 17, 'attracted': 14, 'attached': 7, 'fearless': 7, 'hated': 7, 'adequate': 6, 'anxious': 6, 'loved': 5, 'esteemed': 5, 'surprise': 5, 'alone': 5, 'entitled': 5, 'cheated': 3, 'powerless': 3, 'safe': 2, 'average': 2, 'focused': 2, 'free': 2, 'singled

out': 2, ' apathetic': 2, ' lost': 2, 'bored': 1, 'demoralized': 1, 'independent': 1, 'co-dependent': 1, ' derailed': 1, 'embarrassed': 1, ' burdened': 1, 'obsessed': 1, 'ecstatic': 1) as shown in Figure (2):

Figure (2) SA of Lee's *To Kill a Mockingbird*

Overall, the NLTK sentiment analyser detected a dominant positive sentiment.
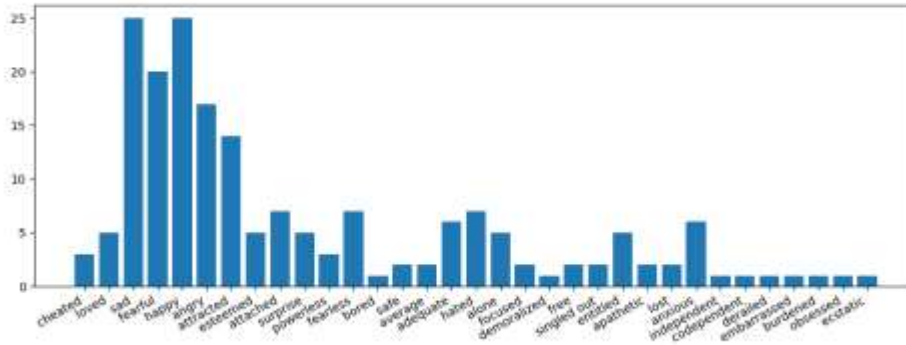
4.1.3 Sentiment Analysis of Zusak's *The Book Thief*

Markus Zusak's *The Book Thief* was initially released in the US in 2006. This book, which was later adjusted into a film, is based on the experiences of Jewish sympathizers in Nazi Germany. The themes of benevolence, brutality, mortality, and the influence of language are explored in this youthful grown-up historical novel. The program detected the emotions for *The Book Thief* along with the number of times each word was used as follows: ('happy': 26, ' sad': 26, ' angry': 17, ' fearful': 16, ' attracted': 13, ' powerless': 10, ' adequate': 9, ' hated': 9, ' anxious': 8, ' attached': 7, ' fearless': 7, ' surprise': 6, ' cheated': 4, ' entitled': 4, ' alone': 4, ' embarrassed': 3, ' average': 3, ' obsessed': 3, ' focused': 3, ' derailed': 3, ' apathetic': 3, ' loved': 3, ' lustful': 2, ' belittled': 2, ' free': 2, ' singled out': 2, ' esteemed': 1, '

bored': 1, ' safe': 1, ' demoralized': 1, ' lost': 1, ' independent': 1, ' ecstatic': 1) as shown in Figure 3.

Figure (3) SA of Zusak's *The Book Thief*

The overall dominant sentiment detected was positive.
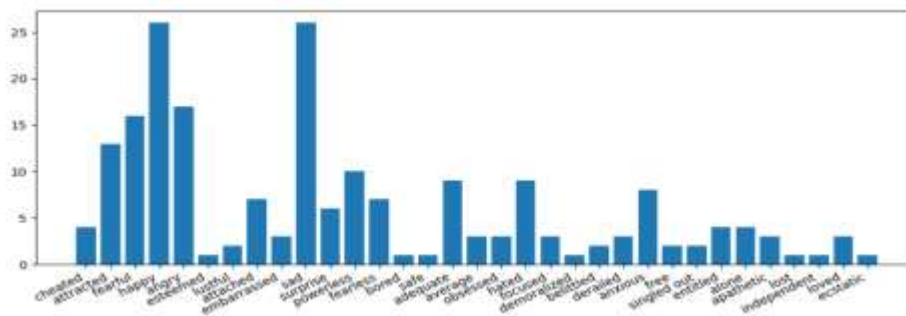
4.2 Questionnaire's Fulfillment

In this section, the questions raised in the questionnaire will be answered by the selected participants.

Participants' Answers for Question 1:

Participant 1: AI now handles contract preparation, which is the process of manually creating contracts and passing them along to various layers of staff

Participants 2 and 3: AI currently does customer service by responding to any commonly asked questions (FAQ) that a consumer may have.

Participant 4: Finance management describes how employees are paid every month. Before, the financial manager had to provide physically each employee's check. Employees no longer need to check their salaries with a finance manager to pick up their monthly paychecks because that activity has been automated.

Participant 5: Since a device smaller than an ATM has been built and installed in various locations throughout the city of Sulaimani, it is no longer necessary to utilize a sales agent. Without the assistance of a salesperson, a consumer can use this machine to choose and purchase any SIM number from the machine's list of numbers.

Participants' Answers for Question 2:

Participants 1 and 2: Cyber security is a career path that uses programming for the upscaling of the security of the company. It is a new job title which has been highly focused on recently.

Participant 3: A data scientist is a person who analyses and interprets complex digital data, such as usage statistics of a website.

Participant 4: UI UX users (meaning user experience) focus on the analysis of what users both think and feel.

Participant 5: Data warehouse management is a new career path concerned with subscription management. It analyses the age and preference of a person to send relevant notifications in the future.

Participants' Answers for Question 3: all participants agreed that "to some extent difficult" and stated that it is challenging to completely replace human labor with AI since certain activities will always require human intervention. The previously described responses, such as customer service agents which more booths will be constructed to improve the selling process.

Participants' Answers for Question 4: all participants agreed that AI is mostly utilized for contract preparation, even though this is not automated because the actual processing of the contract must still be done by hand.

Participants' Answers for Question 5: two participants have chosen "extremely difficult" while three have chosen 'to some extent difficult'. Yet, thousands of additional tasks at Asiacell and in various further businesses than telecommunication companies, they added, may, however, be totally or substantially automated Hence, it would be challenging to entirely replace all professional careers because people value human interaction over AI in places like Asiacell, where customers' experiences and feelings are greatly valued.

5.1 Findings

This section includes a comprehensive analysis of the research findings and a critical assessment of the strengths and weaknesses of this study is presented. Initially, the first research aim of this paper was to create a program that would substitute a human's career in the language sector where the SA program will simplify the task of an emotive stylistician. The second aim was to seek a practical setting in which human jobs in the language industry were being automated by AI due to recent technological breakthroughs, for which a questionnaire has been sent to participants in a telecommunications company. The program was created successfully. However, its ability to automate a human's career was remarkably difficult than expected, unlike the predicted hypothesis in which the substitution was deemed possible. Furthermore, the questionnaire hypothesized that AI will begin to have a powerful effect on tasks in the telecommunications industry where participants noted numerous applications of AI in their industry.

5.1.1 Results of the Efficiency of the NLP Software Program

The software has proven reasonably effective in analysing and identifying words that convey emotions. In the selected novels, the program detected that the predominant sentiment was positive. One of the major advantages of this investigation was how efficiently the data were collected because the software program completed the task that would have taken stylistics months to do. However, the main disadvantage of the NLTK program is that it detects the average sentiment based on emotions conveyed through words alone. Data scientists have developed certain programs that also detect the sentiment of the context. This does not preclude the possibility that some positive words could convey a negative sentiment, which the more recent computer programs will be able to identify. These tools, however, are still underdeveloped and unable to handle vast amounts of data effectively. Overall, it is only a matter of time before a program that can identify sentiment contextually, and the NLTK program will be developed.

5.1.2 Results of the Questionnaire Analysis

The questionnaire proved useful in gathering the information needed to answer the research question of whether AI would have a bigger impact on telecommunications in the future. The participants listed a variety of applications for AI in their field, including the automation of formerly manual operations. In connection with the total automation, all the participants' responses were reluctant and doubtful. Although they were aware of the growing effect of AI in telecommunications, they found

it impossible to envision a day when there would be no humans present at their workplace for the following reasons: firstly, new job routes emerged when each career was replaced by AI. Secondly, since the telecommunications sector is highly customer-oriented, it is challenging for AI to become dominant since individuals are not ready to adjust to such a drastic change in lifestyle.

6. Conclusion

In conclusion, while computational linguistics has the potential to automate some tasks currently carried out by humans, it is unlikely that this technology would ever completely replace people in the workplace in its current form. Since machines are getting improved at tasks like speech recognition and language translation, they still struggle to understand complex language and context-dependent concepts like humor, sarcasm, and irony. In addition, many computational linguistics applications require human input and supervision, such as creating training datasets and assessing the effectiveness of NLP systems. In contrast, it is more likely that computational linguistics will assist and enhance human abilities, allowing them to perform tasks like customer service, content production, and data analysis more quickly and effectively. As a result, at the current stage of AI development, the generated software could not effectively replace the job of stylisticians. However, various tasks including those in the language profession, can be anticipated to be automated shortly about telecommunications. The human touch will still be required in telecommunication businesses given the state of technology at this moment, even though this will replace prior occupations and provide possibilities for new career choices.

Conflicts of Interest: The authors declare no conflict of interest.
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