

Artificial Intelligence for Pronunciation Improvement in Second Language Acquisition

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Abstract: *Along with the Improvement of technology, there are numerous possibilities that are opening up. For instance, the linguistics industry is vividly impacted by the improvement in technology. Thus, the study has aimed to analyze the importance of Artificial Intelligence for Pronunciation Improvement in Second Language Acquisition. For the study primary data was collected from a sample size of 65 and quantitative analysis was conducted. The outcome of the study showed that with reliable progress reports and a massive database of language accuracy in AI models can be achieved. The additional cost was found a major hindrance to implementing AI for natural language processing. Hence it was recommended that working on the model development's correctness is crucial to enhance pronunciation accuracy. Additionally, it would be beneficial to search for mass implications to help offset the expense.*

Keywords: Artificial Intelligence, Pronunciation, Second Language Acquisition

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Introduction

Second language acquisition (SLA) is one of the growing sectors of language services with the increasing globalization. As per the opinion of Noviyanti (2020) acquiring a second language helps in achieving distinctive cognitive abilities for the individual. Additionally, with the improvement in technology, such as AI, the possibility of language processing services is growing leaps and bounds. Hence, the following analysis has focused on analyzing AI for pronunciation improvement.

It was noted that there are certain issues associated with using AI to improve pronunciation. For instance, cost-effectiveness is a major problem that hinders the implication of AI in language processing models (Guo, Yang & Gan, 2019). Additionally, AI runs on data, hence data bias and accuracy of data is major factors for such models.

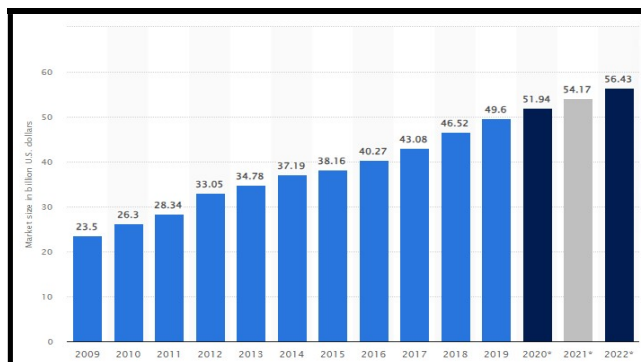


Figure 1: Global market size of industry related to language services. (Source: Statista, 2022)

Figure 1 of the analysis is associated with the global language services projection. In the projection, a predictive analysis can be seen where the growth of the market is illustrated. It can be seen that the global language services were 23.5 billion USD (Statista, 2022). However, in 10 years stable growth was observed and in 2019 the market was 49.6 billion USD (Statista, 2022). Thus, it can be contemplated that there is a massive chance of growth in the linguistic market. Moreover, with the implication of AI the possibilities are endless. Hence, such possibilities in the market justified the rationality of the study.

Aim

The primary aim of the study is to analyze the importance of Artificial Intelligence for Pronunciation Improvement in Second Language Acquisition.

Research Objectives

- RO1: To analyze the importance of AI for achieving improvement in pronunciation for SLA
- RO2: To determine the possible challenges that can hinder the process of accuracy in pronunciation
- RO3: To understand the impact of different variables that can impact the pronunciation improvement
- RO4: To suggest reliable outcomes for improving pronunciation for SLA with AI

Research Questions

- RQ1: What is the importance of AI for achieving improvement in pronunciation for SLA?
- RQ2: How the possible challenges that can hinder the process of accuracy in pronunciation?
- RQ3: What is the impact of different variables that can impact the pronunciation improvement for SLA?
- RQ4: How the process of improving pronunciation for SLA with AI can be achieved?

Literature Review

Importance of AI for achieving improvement in pronunciation for SLA: During the past analysis, it was noted that with the development of technology, the possibilities of different indices are increasing. Similarly, for the language processing industry, there are specific models such as Xnet and RoBERTa that provide accuracy in the language processing models.

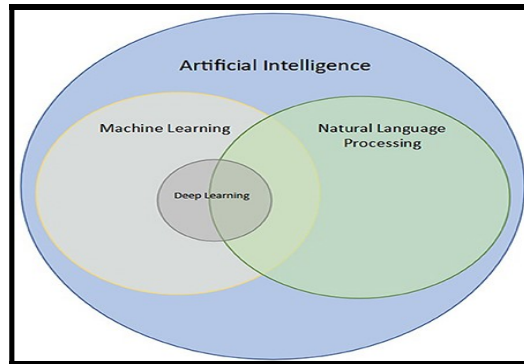


Figure 2: Venn diagram of AI in language processing. (Source: Kazu&Kuvvetli, 2023)

In Figure 2 of the study, a Venn diagram is presented where language processing with AI is illustrated. It can be seen that for natural language processing a combination of machine learning and deep learning is essential. As per the suggestion of Kazu & Kuvvetli (2023), AI is still in the development phase hence the possibilities for improvement are huge. Therefore, with further development accuracy in language processing can be achieved. On the other hand, Yang & Kyun (2022) pointed out that AI modules run on data hence there is a possibility of data security in the process of natural language processing. Additionally, for improving the accuracy of pronunciation the implication of AI is still in question. Thus, from the above critical analysis, a discrete understanding related to the use of AI can be contemplated. Moreover, for the initiation phase, there are associated risks and lack of accuracy, however, the improvement in the misuse and reliable system that aids in improving the accuracy of language processing can be contemplated.

Challenges associated with using AI for improving pronunciation in SLA: Through the analysis of literature, it was noted that there are definite issues related to the implication of AI for natural language

processing. Moreover, such challenges hinder the process of implementing AI to improve pronunciation in SLA.

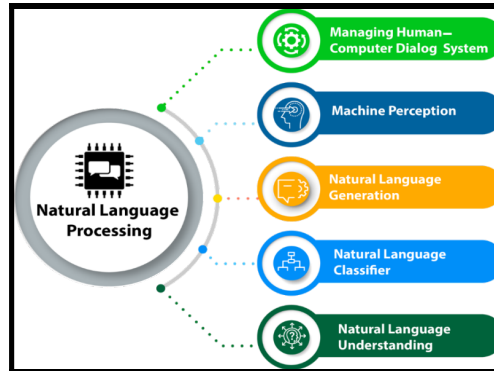


Figure 3: Challenges related with implementing AI in NLP. (Source: Kim, Cha & Kim 2019)

Figure 3 is associated with challenges associated with AI in natural language processing. Additionally, it was noted that there are some other challenges that create challenges for implementing AI in SLA. As per the opinion of Kim, Cha & Kim (2019), one of the major and general issues of implementing AI is related to the cost of AI. Therefore, the cost of AI is a major hindrance to the mass implication of AI. On the other hand, Khoshshima, Saed & Moradi (2019) stated that with the implication of AI ethical concern is a major issue. AI is still not regulated by the government or any other private body. Therefore, ethical concerns for the implementation of AI are a major concern for implementing the same for language processing. Therefore, it can be contemplated that the challenges related to AI are subjective and can vary.

Methodology

Data collection: The process of collating data has a direct impact on an empirical analysis. For the study of the role of AI in pronunciation improvement in second language acquisition, the primary source of data collection was chosen. As per the opinion of Zakiyyah, Setyaji&Ardini (2022) primary data aids in providing a relay time idea related to a topic. Moreover, the process of primary data analysis helps collect data from people related to the topic. Hence for that reason, primary sources of data were chosen. In order to achieve the goal of primary data collection a sample size of 65 persons is chosen through random sample selection. Thus, an unbiased and reliable data set was achieved for the specific study. The sample size was surveyed with the help of a questionnaire consisting of 10 variable-related questions and 3 demographic questions. Moreover, the inclusion of demographic questions allows for analysis of the impact of demographic factors on the participants (Pourhosein, Gilakjani&Rahimy, 2019). Thus, comprehensible and trustworthy data was collected through the process of primary data collection.

Data Analysis: After the collection of data, all the collated data set was analysed through quantitative methods of analysis. As per the suggestion of Wongsuriya (2020), the method of quantitative analysis aids in providing rational relations among the data sets. Moreover, through quantitative analysis, a reliable outcome through following the objectives can be achieved. In order to analyse the data in a quantitative manner IBM SPSS software was used. For a better contemplation of the data set regression analysis along with a table of ANOVA, officiant and model summary was presented. In addition, for understating the outliers and the nature of the dataset a table of descriptive analysis was presented in the study (Haryadi, S &Aprianoto, 2020). Thus, based on the outcome of the regression analysis hypotheses were tested and a final conclusion was formulated.

Finding and Analysis; Demographic Analysis and Gender

What is your Gender?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Female	18	27.7	27.7	27.7
Male	38	58.5	58.5	86.2
Others	9	13.8	13.8	100.0
Total	65	100.0	100.0	

Table 1: Gender (Source: IBM SPSS)

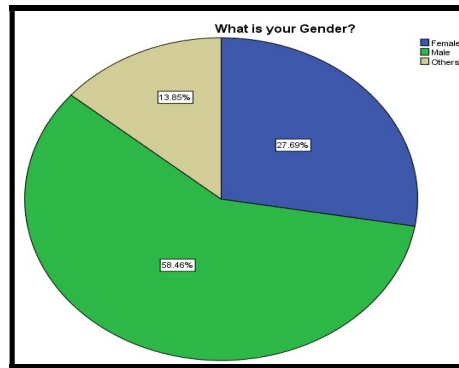


Figure 5: Gender (Source: IBM SPSS)

Table 1 and Figure 5 are associated with the gender analysis of the participants. It can be seen that the frequency of the male is 38 and, in the figure, their representation is 58.5%. Additionally, female members have a frequency of 18 and the representation of female members was 27.7%. There were 13.8% of participants who identified themselves with other gender categories. Therefore, it can be stated that the representation of the male population dominated the data set

Age Group

What is your age?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Below 20	18	27.7	27.7	27.7
Between 20 and 35	38	58.5	58.5	86.2
Between 35 and 60	9	13.8	13.8	100.0
Total	65	100.0	100.0	

Table 2: Age Group (Source: IBM SPSS)

Table 2 of the analysis is associated with the age group of the participants. It can be seen that the age group below 20 represented 27.7 % of the population and had a frequency of 18. The age group between 20 and 35 had a frequency of 38 and a representation of 58.5%. Additionally, the age group between 35 and 60 had a percentage of 13.8% and was represented by 9 participants. Hence, the young and middle age population dominated the data set.

Income Range

What is your monthly income?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Below RS 18000	9	13.8	13.8	13.8
Between RS 18000 and 30000	38	58.5	58.5	72.3
Between RS 30000 and 50000	18	27.7	27.7	100.0
Total	65	100.0	100.0	

Table 3: Income Range (Source: IBM SPSS)

Table 3 is associated with the income range of the participants where a possible range of income is illustrated. Moreover, the percentage for the same was respectively, 13.8%, 58.5%, and 27.7%, thus it can be estimated that the model income range was present in the majority however there was diversity in the data set.

Statistical Analysis and Descriptive Analysis

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
DV	65	2.00	5.00	3.6923	1.04468
IV1	65	3.00	5.00	3.4154	.72656
IV2	65	3.00	5.00	3.4308	.72821
IV3	65	2.00	5.00	3.4308	.90085
IV4	65	2.00	5.00	3.1385	.98230
Valid N (listwise)	65				

Table 4: Descriptive analysis of different variables (Source: IBM SPSS)

Table 4 of the empirical analysis is associated with the descriptive analysis of the dataset. As per the opinion of Xu et al. (2022), descriptive analysis aids in determining the nature of the data set. In addition, outliers of a data set can be identified through the understanding of descriptive statistics. From the above table, it can be seen that the mean value for the dependent variable is 3.6923 and the standard deviation value for the same is 1.04468. Similarly, 1st, 2nd, 3rd, and 4th independent variables provide mean values of respectively, 3.4154, 3.4308, 3.4308, and 3.1385. In addition, the standard deviation values for the same independent variables are respectively 0.72656, 0.72821, 0.90085, and .98230. As per the opinion of Kholis (2021), a higher mean value indicates that the responses are clustered around the manse. Hence, it is understood that most of the participants agreed with the statement. In addition, a higher mean than standard deviation indicates that the spread of the data set is not on the higher side.

Discussion

A primary quantitative analysis was conducted in order to determine the usefulness of AI for natural language processing. The process by which people learn and become proficient in a language other than their first or native tongue is known as second language acquisition (SLA). Thus, accuracy in the process is a major factor. As per the opinion of Visaltanachoti & Chantana (2021), fluency of reach and understanding of a base language plays a significant role in improving the accuracy of natural language processing. Therefore, based on the fluency the first hypothesis was developed. It was noted that the hypothesis was supported by a significance value of 0.004. Thus, an appropriate relationship between fluency of language and improvement in pronunciation was found. As per the opinion of (Fu, Gu& Yang, 2020), understanding a base language impacts the overall performance of pronunciation for SLA. Therefore, it also was found that understanding different languages is essential for natural language processing.

Additionally, the fourth hypothesis a relationship between feedback and improvement of language processing was described. According to the suggestion of Lan (2022) feedback is essential in order to keep learners engaged with the process of learning. Therefore, feedback was supposed to be a factor impacting the improvements for SLA. It was noticed that for the fourth hypothesis, the significance value was 0.000. Thus, the entire null hypothesis was rejected based on the signified value. Therefore, found that providing reliable feedback is important in order to improve the accuracy of natural language processing. Hence it can be recommended that in order to improve the pronunciation for SLA it is essential to work on the accuracy of the model development. Furthermore, for countering the cost of such systems looking for mass implication would be helpful.

Conclusion

Thus, a detailed analysis for improving pronunciation accuracy in SLA with AI is presented in the study. It was noted that in order to improve renunciation implementing accuracy in the feedback can be beneficial. In addition, having a wide range of languages can ease the process of learning languages. In addition, challenges such as cost efficiency were noted in the past literature. It was noted that with a mass implication such issues can be resolved. Additionally, using accurate algorithms and improving the accuracy of the natural language processing modules can be beneficial for improving accuracy.

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APPENDIX: SURVEY QUESTIONNAIRE

Survey link: <https://docs.google.com/forms/d/1eOe6sUaLEqYmiGGOxCbzPrhWqDA9c1DHhZm6a8f7qs/edit>

1. What is your Gender?
2. What is your age?
3. What is your monthly Income?
4. Improvement of pronunciation in SLA directly depends on the process of teaching of the application
5. Phonetics training for the AI-based learning application impacts the pronunciation practice for SLA
6. The cognitive ability of the learner is proportionally related to the fluency of speech
7. Fluency of speech is a subjective element that varies from language to language
8. Providing sufficient practice modules to the learner aids in improving the accuracy of speaking
9. Use of an AI model that is related with the accuracy of the accuracy of pronunciation
10. Providing personalized feedback to the users is essential for an SLA algorithm
11. The adaptability of the algorithm has a significant impact on the process of SLA
12. Comprehension of the process is essential for learning thus it needs to be easy to understand
13. Reliable feedback and suggestions to improve the language acquisition process are related to the effectiveness of SLA