

LANGUAGE TRANSLATOR

A PROJECT REPORT

Submitted by

Jehan Patel (21BCE10551)

Abhinav (21BCE10629)

B. Vijay (21BCE10609)

Neel Jain (21BCE10542)

Sarvesh Aditya J. (21BCE10570)

*in partial fulfillment for the award of the degree
of*

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING



SCHOOL OF COMPUTING SCIENCE AND ENGINEERING

VIT BHOPAL UNIVERSITY

**KOTHRIKALAN, SEHORE
MADHYA PRADESH - 466114**

Sept 2022

**VIT BHOPAL UNIVERSITY, KOTHRIKALAN, SEHORE
MADHYA PRADESH – 466114**

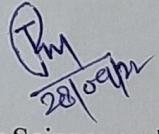
BONAFIDE CERTIFICATE

Certified that this project report titled “**LANGUAGE TRANSLATOR**” is the bonafide work of “**Jehan Patel (21BCE10551), Abhinav (21BCE10629), B. Vijay (21BCE10609), Neel Jain (21BCE10542), Sarvesh Aditya J. (21BCE10570)**” who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported here does not form part of any other project / research work on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

PROGRAM CHAIR

PROJECT GUIDE

School of Computer Science and Engineering
VIT BHOPAL UNIVERSITY


School of Computer Science and Engineering
VIT BHOPAL UNIVERSITY

The Project Exhibition I Examination is held on 29th September 2022

ACKNOWLEDGEMENT

First and foremost I would like to thank the Lord Almighty for His presence and immense blessings throughout the project work.

I wish to express my heartfelt gratitude to **Dr. Sandip Mal**, Head of the Department, School of Computing Science and Engineering for much of his valuable support encouragement in carrying out this work.

I would like to thank my internal guide **Mr. Jay Prakash Maurya** for continually guiding and actively participating in my project, giving valuable suggestions to complete the project work.

I would like to thank all the technical and teaching staff of the School of Computing Science and Engineering, who extended directly or indirectly all support.

Last, but not the least, I am deeply indebted to my parents who have been the greatest support while I worked day and night for the project to make it a success.

LIST OF ABBREVIATIONS

ABR	FULL FORM	PAGE NO.
API	Application programming interface	12
SL	Source Language	13
TL	Translation Language	13
GUI	Graphical User Interface	19
ACS	Amazon Common Servies	20
NMT	Neural Machine Translation	21
UUID	Universal Unique Identifier	21
SDK	Software Development Kit	22

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1	Bar graph for statistics	10
2	Tkinter	18
3	SDK	18
4	Speech SDK	19
5	Performance Measure	21

ABSTRACT

This paper stresses the role of translation in teaching different foreign languages. The students who practice translation helps improve his/her linguistic competence in various languages and therefore help develop his bilingual skills. It is necessary to draw on the pedagogy of translation in order to set practice on sustainable foundation. Through this paper, we will try to explain our software and how it is helpful to different kinds of regions and people speaking different languages.

Python Programming language today provides adequate and easy setup of programs with the availability of various different modules which are used on a day-to-day basis for different purposes such as Machine Learning Models and Artificial Intelligence. We chose Python as our programming language because of its simplicity and weight of the code along with widespread availability. The authors of the paper present a solution with the help of python and the Microsoft Azure Cognitive Services to make a lightweight and efficient solution for the same.

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	List of Abbreviations	4
	List of Figures	5
	Abstract	6
1	INTRODUCTION	
	1.1 Introduction	11
	1.2 Motivation for the work	12
	1.3 About	12
	1.4 Problem Statement	13
	1.5 Objective of the work	14
	1.6 Summary	
2	LITERATURE SURVEY	
	2.1 Introduction	16
	2.2 Programming Language Used	16
	2.3 API's used	
	2.3.1 Text Translation	17
	2.3.2 Speech to Text	17
	2.3.3 Text to Speech	17
	2.5 API Issues	
	2.6 Summary	17
		18
3	SYSTEM ANALYSIS	
	3.1 Introduction	18
	3.2 Disadvantages/Limitations in the existing system	18
	3.3 Proposed System	19
	3.3.1 Own Machine Learning Model	19
	3.4 Summary	
		19

4	SYSTEM DESIGN AND IMPLEMENTATION	
	4.1 Introduction	20
	4.2 Tkinter Module	20
	4.3 UUID Module	20
	4.4 SDK Module	20
	4.5 Speech SDK Module	21
	4.6 Summary	21
		22
5	PERFORMANCE ANALYSIS	
	5.1 Introduction	25
	5.2 Performance Measures	25
	5.3 Summary	26
6	FUTURE ENHANCEMENT AND CONCLUSION	
	6.1 Introduction	27
	6.2 Limitation/Constraints of the System	27
	6.3 Future Enhancements	28
	6.4 Conclusion	29
	References	29

INTRODUCTION

1.1 Introduction

Language Translation is the process of conveying a written source language text clearly, completely, accurately, and appropriately in a target language. Translation allows information to be transferred across languages, expanding accessibility of the information. The translation process involves translation, editing, and proofreading. Training programs at NMHSs may be able to use translation as a cost-effective means to expand their training program's offerings.

Translation is an activity, a product, and a process. As an activity, translation is a complex act that requires close reading of a text in the source language, understanding its meaning, and creating an equivalent text in the target language. The word "translation" also refers to the product of this activity: the final target language text that will be published or distributed. Although this document will touch on these aspects of translating, we will focus primarily on the process of creating a translation, using this definition.

Today, translation is more widespread and accessible than ever before. Translation efforts can be organized in creative ways: organizations with larger budgets may choose to hire a translation company or independent professional translators to handle all of their translation needs; organizations with smaller budgets, or with subject matter that is not familiar to many translators, may decide to combine the services of professional translators with the skills of existing staff members; finally, organizations with a pool of expert volunteers may opt to include their services in the process. Whatever your budget and translation needs, there are ways to make it work.

1.2 Motivation for the work

When we started exploring the world of translation services, we found out that As more and more companies make their services available through the Internet, the need for the translation of websites and web content has also grown. Businesses seek translation services in order to serve their customers and keep up with their demands. Apart from this, individuals also use this type of service.

Due to more people migrating to different countries in search of a better life, they find themselves in an environment with an unfamiliar language. As a result, they may need these translation services for better living. There is seen to be a growing number of industries with the need for Translation and Interpretation services. One of the important trends observed in the translation industry includes acquisitions of specialty language service providers by large translation companies. Also, the growing demand for voice-based content is seen as an important driver for these services. The growing influx of manufactures and multi-national companies in these under-developed countries is expected to play a huge role in creating a demand for translation services. The growing immigration rate from one country to another for jobs and education is also expected to create growth opportunities for translation services.

That's when we decided to simplify the process to make it easier for the common citizen to utilize the power of API's provided by big multinational cooperation's to utilize their ever-developing machine learning models and make a software for the people. (check fig 1 below)

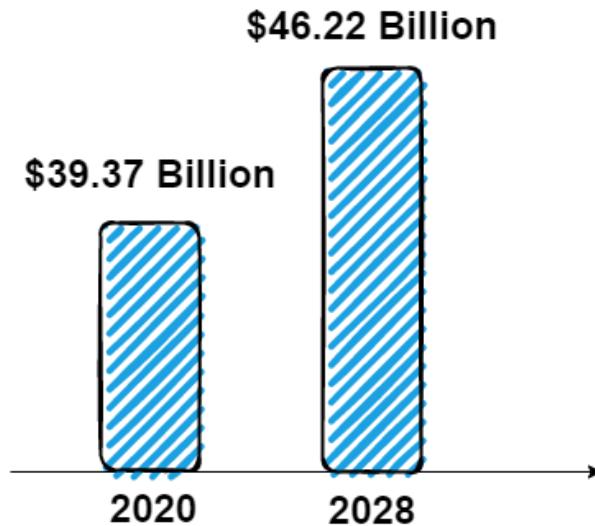


Fig 1 Growth of the translation industry

1.3 About

Translation is one of simple and effective ways to understand another language easily. In order to understand the message from another text accurately, a translator should have knowledge both source and target language. Therefore, a deep understanding of translation will help in doing a good translation text.

There are many requirements that must be fulfilled by a translator in order to make the translation good and understandable. A translator has to have:

- Complete knowledge of the source language (SL)
- Complete knowledge of the target language (TL)
- An intimate acquaintance with the subject matter.

This paper is about our project “Translator” which is our first step taken towards making translation services accurate and widely available using the tools provided to us. We have tried to build a translator with multiple features like text to speech translation and speech to text translation. We are still constantly trying to improve it in every format possible.

1.4 Problem Statement

Let us take an example of our teammate Vijay. He belongs to southern part of India and he has come to VIT Bhopal to peruse his Bachelors degree. It is his first time coming to the northern part of India and he is facing problems understanding the locals and his classmates because he doesn't know how to speak Hindi. He tried google translate but he wanted to translate instantly at a push of a button without typing anything. What can he do to combat the problems faced?

1.5 Objective of the work

Our objective is to make a simple translator which can translate from any language to any language in

- Text to Text Mode
- Text to Speech Mode
- Speech to Text Mode
- Speech to Speech Mode

1.6 Summary

Language Translation is the process of conveying a written source language text clearly, completely, accurately, and appropriately in a target language. Translation allows information to be transferred across languages, expanding accessibility of the information. We then wrote

about how we decided to simplify the process to make it easier for the common citizen to utilize the power of API's provided by big multinational cooperation's and make a software for the people. We also saw a real life problem statement of our teammate Vijay and we showcased how our project will be helpful for people. We also showcased some of the features which are unique and things that we offer.

LITERATURE SURVEY

2.1 Introduction

In this section, we will be looking at the different API's used by the program.

Application Programming Interface (API) is a software interface that allows two applications to interact with each other without any user intervention. API is a collection of software functions and procedures. In simple terms, API means a software code that can be accessed or executed. API is defined as a code that helps two different software's to communicate and exchange data with each other. It offers products or services to communicate with other products and services without having to know how they're implemented.

Let see how API works using simple daily life example. Imagine that you went to a restaurant to take lunch or dinner. The waiter comes to you gives you a menu card, and you will provide personalize it order like you want a veg sandwich but without onion. After some time, you will get your order from the waiter. However, it is not that simple as it looks as there is some process that happens in between. Here, the waiter plays an important part as you will neither go to the kitchen to collect your order nor will you tell the kitchen staff what you want all this done by the waiter. API also does the same by taking your request, and just like the waiter tell the system what you want and give a response back to you.

2.2 Programming Language Used

For our program, we have used Python as our language of choice. It is mainly because it is easy to integrate with GUI's due to the abundance of Modules to help improve the program.

Python is a high-level, general-purpose and a very popular programming language. Python programming language (latest Python 3) is being used in web development, Machine Learning applications, along with cutting edge technology in Software Industry. Python Programming Language is very well suited for Beginners, also for experienced programmers with other programming languages like C++ and Java.

What can Python do?

- Python can be used on a server to create web applications.
- Python can be used alongside software to create workflows.
- Python can connect to database systems. It can also read and modify files.
- Python can be used to handle big data and perform complex mathematics.
- Python can be used for rapid prototyping, or for production-ready software development.

2.3 API's used

2.3.1 Text Translation

Text translation is a cloud-based REST API feature of the Translator service that uses neural machine translation technology to enable quick and accurate source-to-target text translation in real time across all supported languages. The API uses the most modern neural machine translation technology, as well as offering statistical machine translation technology. [1] [2]

2.3.2 Speech to Text

Speech-to-text, also known as speech recognition, enables real-time or offline transcription of audio streams into text. Azure's speech-to-text service defaults to using the Universal language model. This model was trained using Microsoft-owned data and is deployed in the cloud. It is optimal for conversational and dictation scenarios.

2.3.3 Text to Speech

The Speech service allows you to convert text into synthesized speech and get a list of supported voices for a region by using a REST API. The text-to-speech REST API supports neural text-to-speech voices, which support specific languages and dialects that are identified by locale. Each available endpoint is associated with a region. A Speech resource key for the endpoint or region that you plan to use is required.

2.4 Issues with API

There are certain issues with the API which are in constant improvement from Microsoft's end. The accuracy of the API is increasing fast and the languages are getting more accurate. However the API is sometimes lacking in accuracy. Also a free subscription can translate up to 1 million characters per month plus the limitations on the number of translation requests is 30 requests per second because of the limitations of the ACS service that the Bing translation API depends on. However these can be later corrected when switched to paid version. Also since our requirement was to use text to speech and speech to text hence the API by Microsoft has more upsides rather than downsides.

2.5 Summary

Till now, we have seen some of the API's that we have used to make the program work like text translator API, Text to Speech API and Speech to Text API according to our needs and we have also discussed some of the downsides of the API being used. We have also seen the reasons why we still have opted for the above-mentioned APIs and seen the functioning of them.

SYSTEM ANALYSIS

3.1 Introduction

In this section, we will be looking at system analysis and will be breaking down the problems and limitations to our program. We will also be looking at the proposed system and discussing more about the current system of processes.

3.2 Disadvantages / Limitations

There are certain disadvantages and limitations which we face as of now. However these can be countered with some improvement in the process flow.

- There are sometimes when the program becomes slow.
- A free subscription can translate up to 1 million characters per month.
- The limitations on the number of translation requests is 30 requests per second because of the limitations of the ACS service that the Bing translation API depends on.
- The Machine Learning Models on a few of the languages is still a little weak which leads to translation errors.

3.3 Proposed System

3.3.1 Custom Machine Learning Model

Our proposed system of work after this project in order to improve the working is to use Custom Translator API. Custom Translator is a feature of the Microsoft Translator service, which enables Translator enterprises, app developers, and language service providers to build customized neural machine translation (NMT) systems. The customized translation systems seamlessly integrate into existing applications, workflows, and websites.

Translation systems built with Custom Translator are available through the same cloud-based, secure, high performance, highly scalable Microsoft Translator Text API V3, that powers billions of translations every day.

The platform enables users to build and publish custom translation systems to and from English. Custom Translator supports more than three dozen languages that map directly to the languages available for NMT.

Since we will have our own neural machine learning model, Our proposed system of work after this project in order to improve the working is to use Custom Translator API. We will have complete control over the accuracy of the model. It will be time consuming but, in the end, it will be self-made by our team

3.4 Summary

Till now, we have seen the limitations of our current state of code and we have also looked at improvements to the code which is through our very own machine learning translation model where we will have support from the Microsoft API plus we will have complete control over the accuracy of the translator.

SYSTEM DESIGN AND IMPLEMENTATION

4.1 Introduction

In this section, we will be looking at system design and implementing the code with its working. We will be looking at the various modules in use in the program and how it is implemented with the help of flowcharts.

4.1 Tkinter

- Tkinter is the standard GUI library for Python. Python when combined with Tkinter provides a fast and easy way to create GUI applications. Tkinter provides a powerful object- oriented interface to the Tk GUI toolkit. Creating a GUI application using Tkinter is an easy task. All you need to do is perform the following steps:-
- Import the Tkinter module.
- Create the GUI application main window.
- Add one or more of the above-mentioned widgets to the GUI application.
- Enter the main event loop to take action against each event triggered by the user.

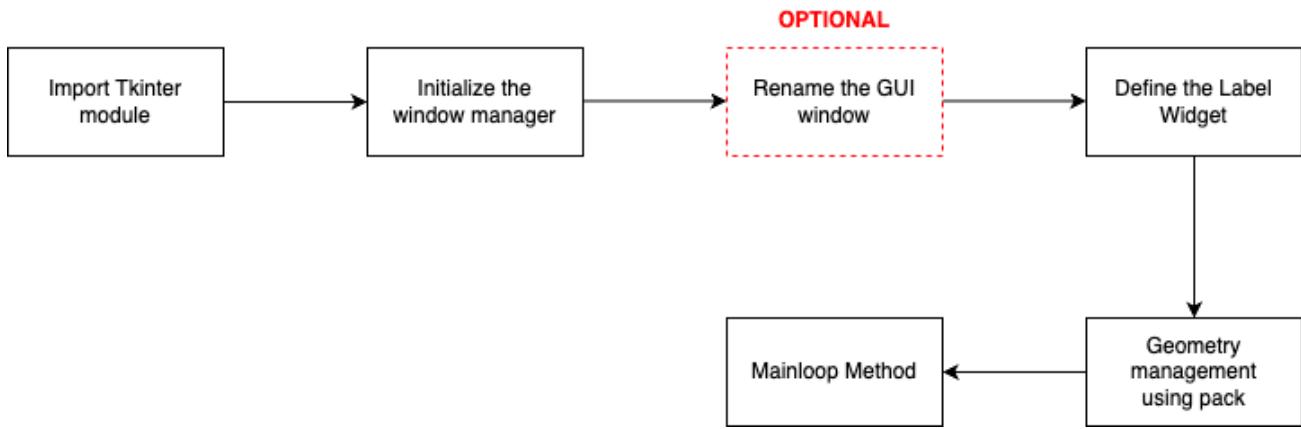


Fig 2 Tkinter Module Flowchart

4.2 **UUID**

Universal Unique Identifier, is a python library which helps in generating random objects of 128 bits as ids. It provides the uniqueness as it generates ids on the basis of time. In this project, UUID is used for localization of the project.

4.3 **SDK**

SDK stands for software development kit or devkit for short. It's a set of software tools and programs used by developers to create applications for specific platforms. In this program, we are using azure.cognitiveservices.speech module as SDK.

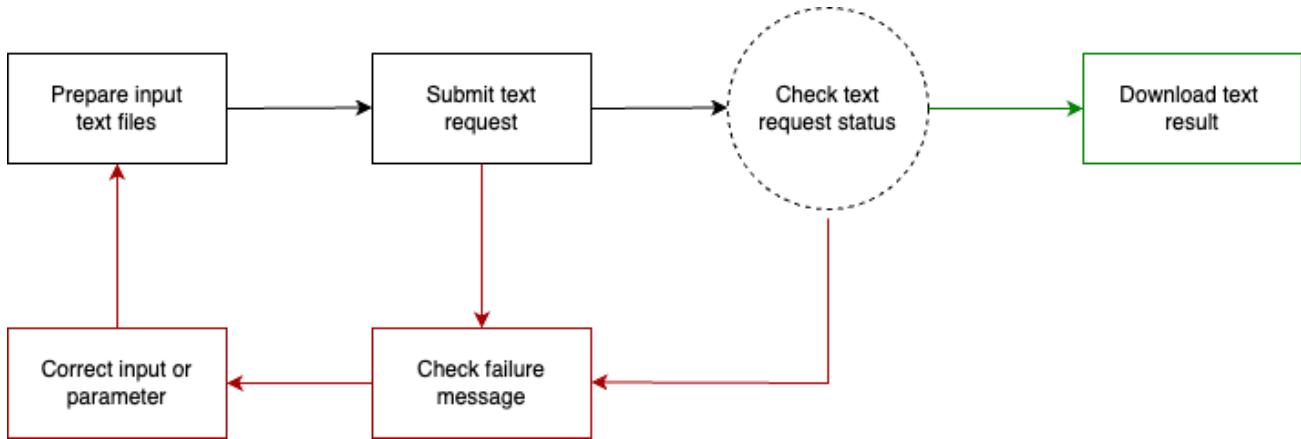


Fig 3 SDK module flowchart

4.4 Speech SDK

The Speech SDK (software development kit) exposes many of the Speech service capabilities, so you can develop speech-enabled applications. The Speech SDK is available in many programming languages and across platforms. The Speech SDK is ideal for both real-time and non-real-time scenarios, by using local devices, files, Azure Blob Storage, and input and output streams.

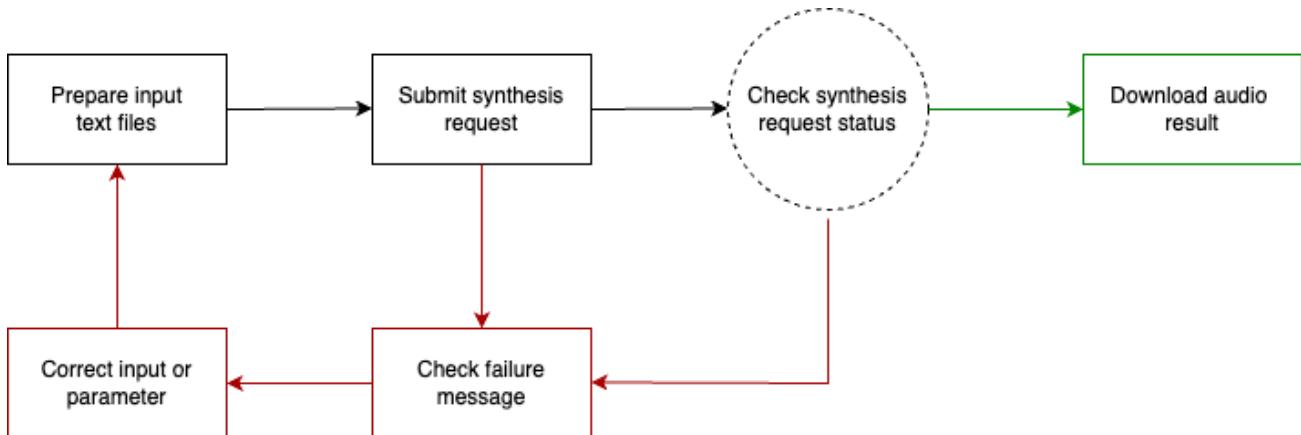


Fig 4 Speech SDK flowchart

4.5 Summary

In this part, we have seen the various modules and its basic information and how the information flows with the program.

PERFORMANCE ANALYSIS

5.1 Introduction

In this section, we will be looking at the performance and the accuracy report of the project with our findings and our tracking's of the project as we kept on building and improving our work since the past 3 months.

5.2 Performance Measures

First we will look at the accuracy index of the API. Since the time we have got the code up and running, we have tested it 30 times and the translation inaccuracy after picking up random languages to translate to turned out to be 4. Hence we can say that that accuracy of the translator is at 87%. The average response time for the code is fast but sometimes it becomes slow due to requests to the API but such cases are minimal in nature.

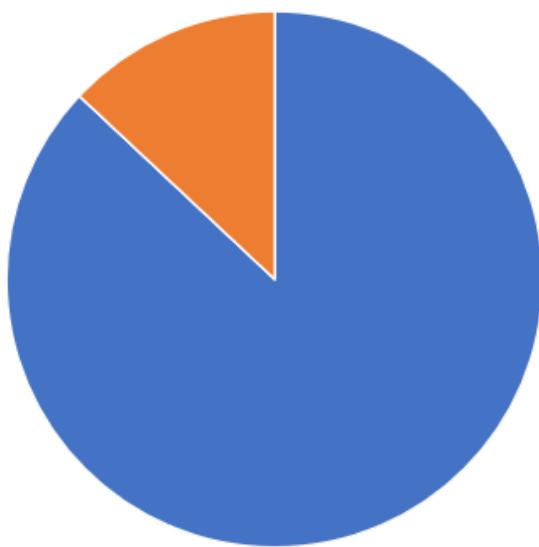


Fig 5 Error Success Pie Chart

Blue color symbolizes the accuracy while the orange color symbolizes the error.

5.3 Summary

We have symbolized the performance and calculated the errors and accuracy of the program. This helped us determine the success of the program.

FUTURE ENHANCEMENT AND CONCLUSION

6.1 Introduction

In this section, we will be looking at the future possibilities and conclusion for the project. We will explore the various possibilities and improvements that we can make to the project in order to make it more useful and accurate for the people and businesses that use them.

6.2 Limitations

There are certain disadvantages and limitations which we face as of now. However these can be countered with some improvement in the process flow.

- There are sometimes when the program becomes slow.
- A free subscription can translate up to 1 million characters per month.
- The limitations on the number of translation requests is 30 requests per second because of the limitations of the ACS service that the Bing translation API depends on.
- The Machine Learning Models on a few of the languages is still a little weak which leads to translation errors.

6.3 Future Enhancements

There are a lot of possibilities to enhance the program for future use. We plan to make a Custom Translator which is a feature of Microsoft Translator service, which enables Translator enterprises, app developers, and language service providers to build customized neural machine translation (NMT) systems. The customized translation systems seamlessly integrate into existing applications, workflows, and websites. [3]

Translation systems built with Custom Translator are available through the same cloud-based, secure, high performance, highly scalable Microsoft Translator Text API V3, that powers billions of translations every day.

The platform enables users to build and publish custom translation systems to and from English. Custom Translator supports more than three dozen languages that map directly to the languages available for NMT. [4]

Since we will have our own neural machine learning model, Our proposed system of work after this project in order to improve the working is to use Custom Translator API. We will have complete control over the accuracy of the model. It will be time consuming but, in the end, it will be self-made by our team.

7 References

1. <https://learn.microsoft.com/en-us/azure/cognitive-services/translator/>
2. <https://learn.microsoft.com/en-us/azure/cognitive-services/translator/text-translation-overview>
3. <https://learn.microsoft.com/en-us/azure/cognitive-services/translator/custom-translator/overview>
4. <https://learn.microsoft.com/en-us/azure/cognitive-services/translator/custom-translator/v2-preview/how-to/train-custom-model>