

Natural Language Processing

CMSC 307 – Artificial Intelligence Applications

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IBM and Snap Logic comparison

Input data (1): This pizza was awful. The tomato sauce tasted expired, and the cheese was disgusting. It was completely inedible. The buffalo wings were great, and the dessert came with a generous portion. The staff was also friendly. Just don't order the pizza or you will be sick!

Input data (2): Every aspect of the restaurant was amazing. Our waitress was extremely nice and thoughtful. The steak I ordered was cooked exactly how I like it. All the appetizers we ordered were delicious. All the dessert options were also fantastic! I highly recommend going to this restaurant!

Figure 1: IBM Watson NLU Sentiment scoring, emotion scoring, word extraction, full document and keyword sentiment scores.

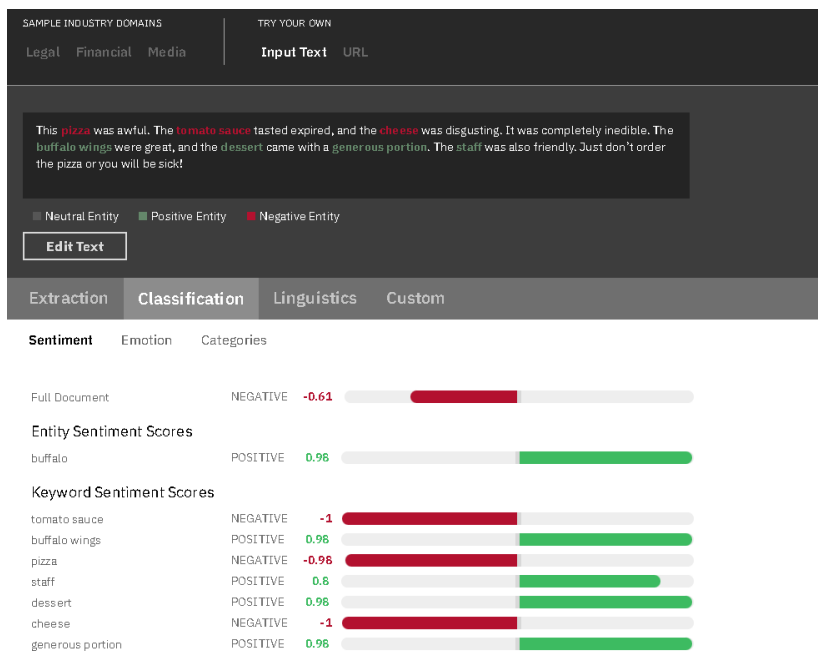


Figure 2: Polarity determined by Snap logics sentiment analysis of input data.

Input: This pizza was awful. The tomato sauce tasted expired, and the cheese was disgusting. It was completely inedible. The buffalo wings were great, and the dessert came with a generous portion. The staff was also friendly. Just don't order the pizza or you will be sick!

Output: { "polarity": -0.27 }

Figure 3: Using the second input data for sentiment analysis using IBM's NLU. Sentiment analysis is provided for the full document, specific keywords, analysis for emotion and tone, and more.

SAMPLE INDUSTRY DOMAINS: Legal, Financial, Media | TRY YOUR OWN: Input Text, URL

Every aspect of the restaurant was amazing. Our waitress was extremely nice and thoughtful. The steak I ordered was cooked exactly how I like it. All the appetizers we ordered were delicious. All the dessert options were also fantastic! I highly recommend going to this restaurant!

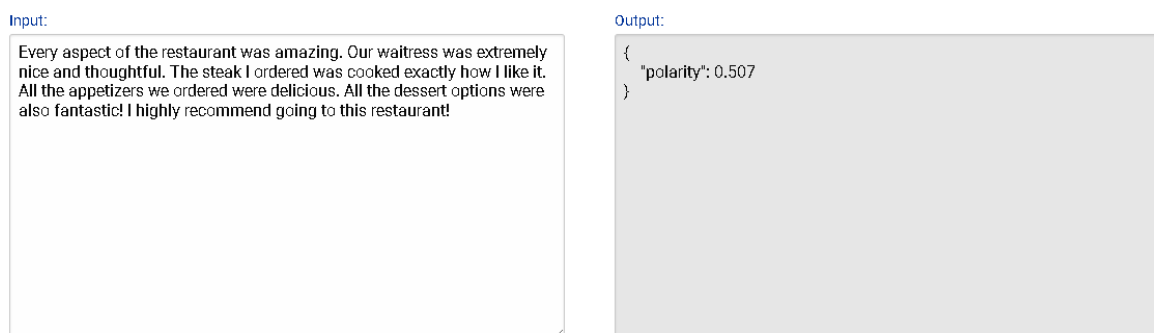
Legend: Neutral Entity, Positive Entity, Negative Entity

Buttons: Edit Text

Navigation: Extraction, Classification, Linguistics, Custom

Sentiment	Emotion	Categories
Full Document	POSITIVE	0.97
Keyword Sentiment Scores		
dessert options	POSITIVE	0.98
aspect of the restaurant	POSITIVE	0.95
steak	POSITIVE	0.93
waitress	POSITIVE	0.99
restaurant	POSITIVE	0.96
appetizers	POSITIVE	0.98

Figure 4: Using Snap Logic's NLP demo to determine sentiment analysis. The analysis of the text is shown through a polarity score.



While IBM Watson provided a thorough explanation and provides several features to explore its language understanding analysis, snap Logic provides a simple polarity score. In snap Logics documentation it is evident that sentiment analysis should be used when dealing with larger data. One example they provide in their documentation is comparing restaurant reviews from one restaurant with thousands of reviews. Researchers used 873 1-star reviews to 873 5 star reviews for sentiment analysis. (*Sentiment Analysis Using SnapLogic Data Science - SnapLogic Documentation - Confluence*, 2023). This creates balanced and unbiased data sets that can be further analyzed to determine issues the restaurant can address to avoid negative reviews. IBM Watson's demonstration of Natural Language Understanding provides an extensive analysis of the first input data. In the sentiment analysis it breaks down each noun and its associated text. From this IBM Watson was able to give an overall sentiment score, and an individual score for each noun used. For example, since I described the tomato sauce as expired, it gave it a sentimental score of -1, while buffalo wings got a score of 0.98 since I said it was good. IBM Watson also provides insight into emotion for the full text, and specific keywords. The input text 'dessert' received a 99.09% for Joy, while 'tomato sauce' received a 91.75% for Disgust. The same was done with the second input data. My expected results were also shown in the second

input data analysis. When seeing the results of the sentiment analysis of the first input data through IBM's application, I expected only positive scoring for the second input data since I only used positive input text with a joyful tone to do a comparative analysis of both inputted texts. It is clear through both the Snap Logic polarity score, and IBM Watson's NLU sentiment analysis that both tools can be utilized to create dependable and reasonable sentiment scores.

Furthermore, because of its reasonable scoring, I can see how industries with massive data sets can compare and use both tools to gain a better understanding of issues that can be fixed in the future.

I believe when comparing the two AI applications, both give reliable and yielded similar sentiment scores when looking at each input data. When looking at the first input text used, snap Logic gave a score of -0.27 while IBM Watson gave a score of -0.61. While I include some positive text and tone, I also expressed a tone of disgust when describing some of the food. Both applications were able to identify that overall, the review is negative rather than positive. When looking at the second input text used, a sentiment score of 0.97 is given through IBM's application, and a score of 0.507 is given through Snap Logics application. This is because a joyful tone and positive content was used for the entirety of the second data. When analyzing both snap Logic sentiment scores in the first input data (-0.27, and 0.507), it is clear that the NLP application is able to analyze and determine positive or negative tones and content. Specifically, when looking at the percentage difference, there is a 288% approximate percentage difference between these two numbers. I believe that snap Logic is an amazing tool to determine sentiment analysis, but it is limited when comparing it to IBM's Watson NLU. When looking at both sentiment analysis scores given by IBM's Watson NLU, appropriate scores were given for both texts. (-0.61 for the first text and 0.97 for the second text.) I believe the first score is appropriate

because it considers the positive content and tone of the text, but ultimately determines the score based on the overall message of the text, which is to be cautious or to avoid the restaurant. Since IBM's application does a thorough analysis of sentiment and emotion for each keyword in the text, it can determine whether the input data is positive or negative even when incorporating different tones, and negative and happy content. In the second input data, since the overall message was that the restaurant is good. IBM's application was able to identify this using emotion and sentiment analysis of the whole text and specific keywords, concluding that the input data is overall positive.

I do believe that IBM Watson is better and easier to use. While snap Logic's provides only one sentiment score, I can see how industries would use it for large data sets. However, the features that come with the IBM Watson demo make the AI program seem more capable of analyzing more complex text thoroughly. Through its semantic roles, syntax categorization, and emotional classification. I would personally use IBM Watson's NLU A.I. based on my first impressions.

When looking at text to speech tools, I used FreeTTS.com to create my prompt and generate an mp3 file. The mp3 file consists of the prompt converted into speech format and utilizing human like speech to create the welcoming audio message. FreeTTS allows users to generate prompts into speech with 65 different A.I generated human like voices. Arguably, some of the voices sound more robotic than human like. However, some of the options offered do resemble human speech.

Figure 5: FreeTTS User Interface. Ability to convert text to speech into mp3 files using 65 different voices (for English). The Prompt I used was: “Hello and Greetings, My name is Alvin. Today's date is April 4, 2024. One place I would like to visit one day is Croatia!” I then used one of the following voices offered on the site to convert my text to speech.

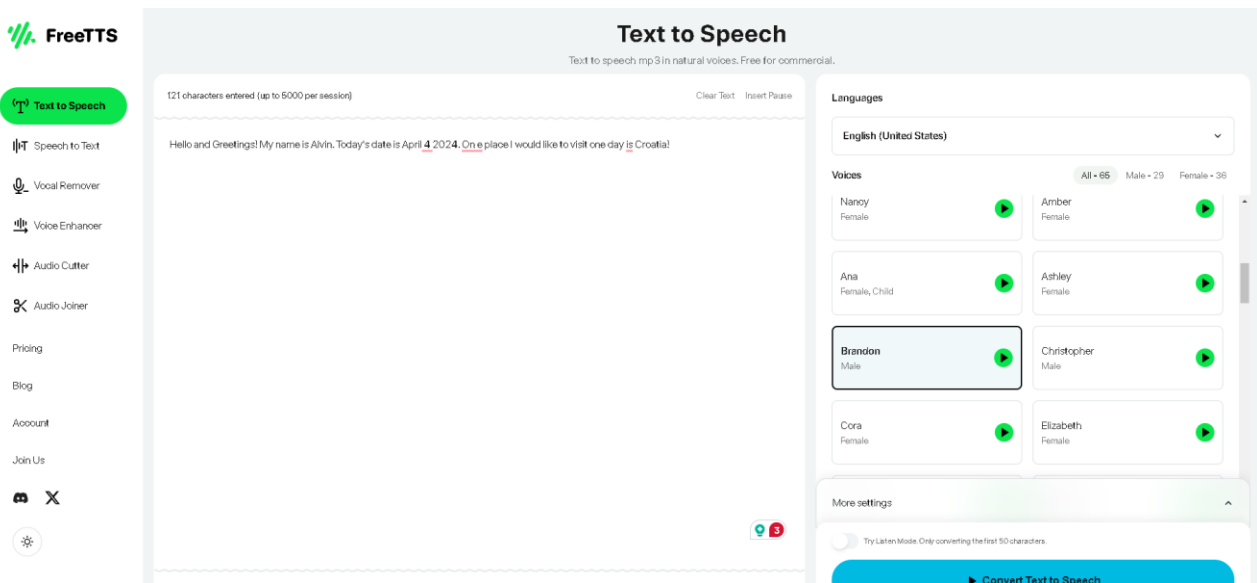
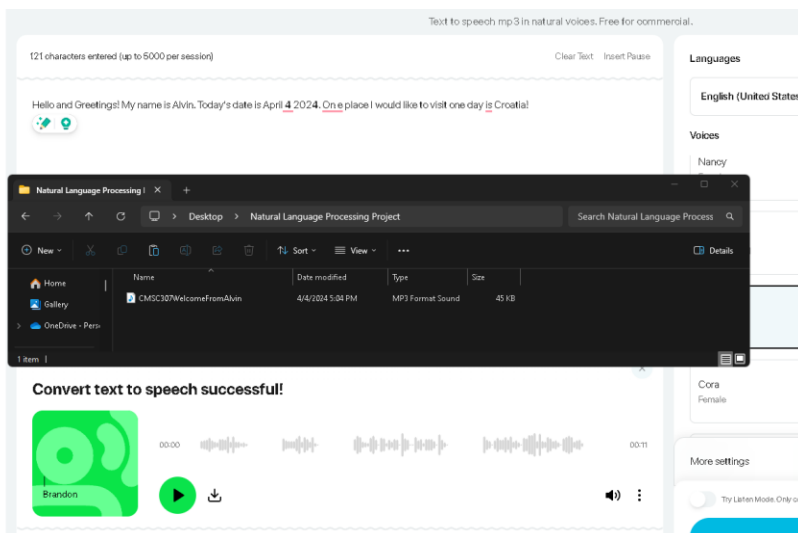


Figure 6: When successfully converting text to speech, you may listen to the audio, or download an mp3 file with your converted text. The mp3 file should resemble the voice you chose and should follow the text prompt you entered.



Using Translation Services

Step 7: Excerpt 1: “My recommendation is to use Amazon Web Services (AWS) to enhance the current IT architecture at Don & Associates. AWS has a long reputation for being one of the best cloud providers on the market. With all their customized features and low pricing, it is easy to manage and scale how much our network actually needs. Eliminating the use of underused servers and end machines. Features such as Amazon EC2, which provides virtual CPU’s, memory, storage, and network configuration. Amazon EBS, which allows additional block storage within EC2, and Amazon Detective providing security issues within the network and much more. Many organizations have praised AWS for cost efficiency and management.”

Excerpt 2: “Additionally, the maternity unit will be locked with an 8-digit pin to enter the Maternity unit. The security manager will advise all employees and staff to create a digital signature, Key, and profile, to create a PGP encrypted messaging system. The passcode to the maternity unit will be changed every week. This code will be sent out to trusted employees via PGP encryption that are allowed within the maternity unit, the employees would need to decrypt the message sent by the security manager to gain access to the maternity unit each week. The security managers can also choose different indoor camera systems that are to their convenience if it abides by the security policy established by the hospital.” (Both excerpts are from previous course work.)

Figure 7: Translation of first excerpt into Hungarian. (English auto detected)

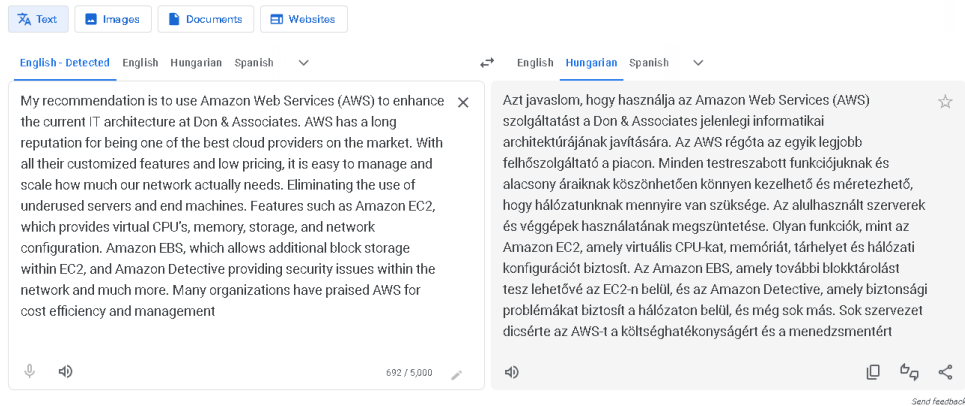


Figure 8: Translation of excerpt in Hungarian back into English (Detect language to English.)

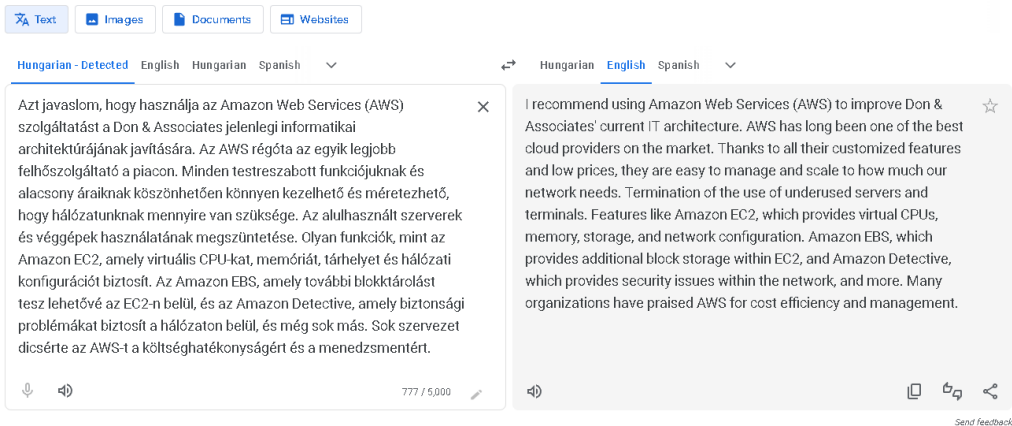


Figure 9: Second excerpt translated into Hungarian.

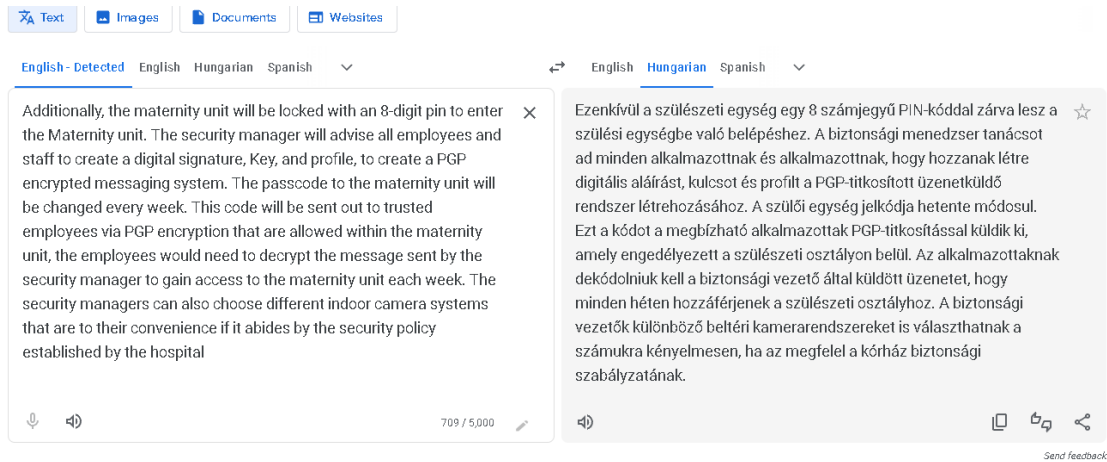
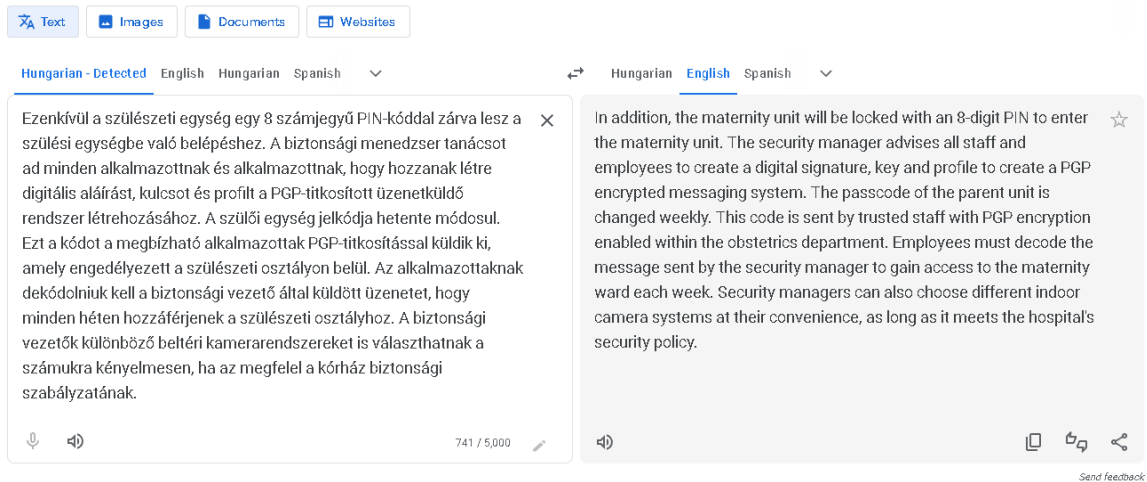


Figure 10: Second excerpt in Hungarian translated back into English. Using ‘detect language’ to English.



Overall, both excerpts provided the same overall meaning even when doing a round trip translation. In the first excerpt round trip translation, I was surprised to see some punctuational and grammatical errors. Several of the sentences used in the original transcript became a run on sentence and made the passage less formal. The translation also simplified certain sentences and made grammatical errors. One part in the original text that was used “AWS has a long reputation for being one of the best cloud providers on the market.” Was translated to “AWS has long been one of the best cloud providers on the market.” Although the overall round-trip translation is still understandable and remains in context, there are still some limitations to Google Translate that make the text informal. For the second-round trip translation, the text also had some grammatical changes, however, it did not affect the content of the message or make the text informal to English readers. I assume this is due to some words and certain phrases being more difficult to translate. For example, the term ‘maternity unit’ was used twice in the original excerpt, it was successfully translated once, but then used ‘obstetrics department’ instead of ‘maternity unit.’ In the first excerpt the term ‘end machines’ was used to describe computers or network devices. In the round-trip translation end machines was translated into ‘terminal’ which can confuse some English readers since terminals and end machines are not necessarily the same. Nevertheless, both round-trip translations convey the same overall message as the excerpts.

In the future I envision using Google Translate, Amazon Translate, or Microsoft Bing’s Translator. These organizations all have similar goals, which is to create stronger language-based applications to create efficient translation and communication between various languages. These three services are already widely available and are considered the best language translation applications. Although they are not perfect at direct translation, these applications can create effective translation of texts, transcripts, documents and more for various languages. For

example, if I wanted to translate a research paper from Turkish to English, I can use one of the services I listed for translation.

Exploring translate and text to speech

5 questions for trip to Hungary:

Which direction is the train station?

Can you recommend me a restaurant that's good?

May I please have some water?

Where is the closest grocery store?

Where is the nicest view of the parliament building?

Figure 11: Translation of questions into Hungarian using google translate.

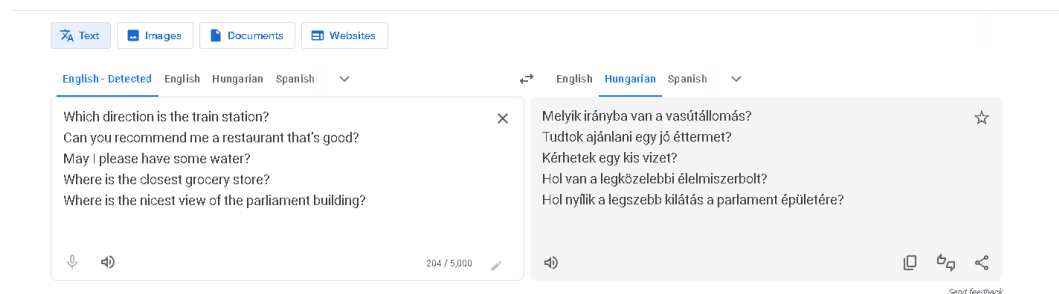
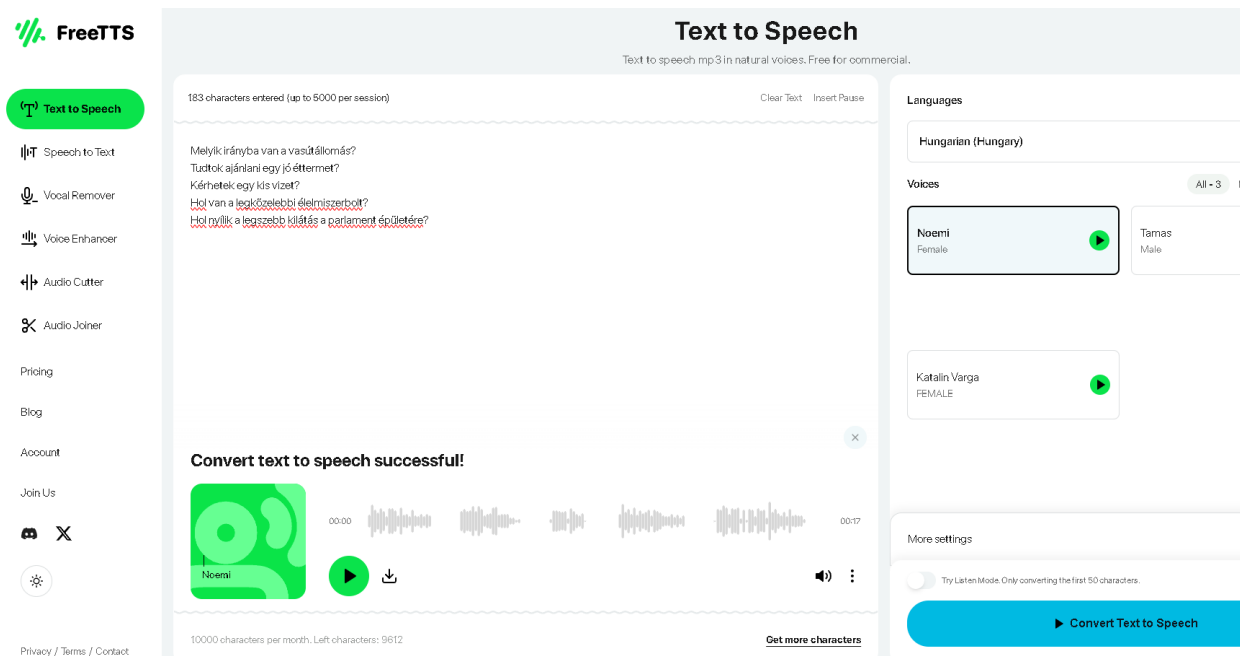


Figure 12: Translation of questions converted into speech using FreeTTS.



The use of NLP AI services is very intriguing. It's surprising how easy it is to translate text, convert text to speech, analyze text using AI applications, and much more. Even in my excerpts where I explore physical and network security functions and services, translation services were able to give a concise and accurate translation of my excerpts, even when using certain English phrases. Although some grammatical and punctuation issues occurred, round about translations were still concise and understandable to the English reader. When exploring Snap Logic and IBM's NLP AI services I was shocked by both applications' capabilities. Various industries can use these applications for their benefit. In the case study previously mentioned by Snap Logic, industries like restaurants, hotels, resorts, and many more that rely on online reviews can use these applications to determine future solutions to provide better services and meet the needs of the customer. When looking at Text to speech conversion, I was surprised to see how easy it is to create audio files on demand with whatever text you want, and in whichever language you choose. Although the audio tries to replicate a human voice, when using FreeTTS some voices

can be seen as robotic. However, through all these applications and its minor limitations, I can see how it can benefit many industries in the future. For industries looking to expand internationally, these programs can be used for customer support to implement various languages and dialects within various online portals, telephone service lines, chatbots, and much more. In the medical field I can see how future NLP AI can be more prevalent. Often, human translators must be found in order for patients to understand diagnoses, treatments, examinations and more. In the future medical industries can use NLP AI applications to streamline communication between a patient and a doctor, making the process much easier and comfortable for all people involved.

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