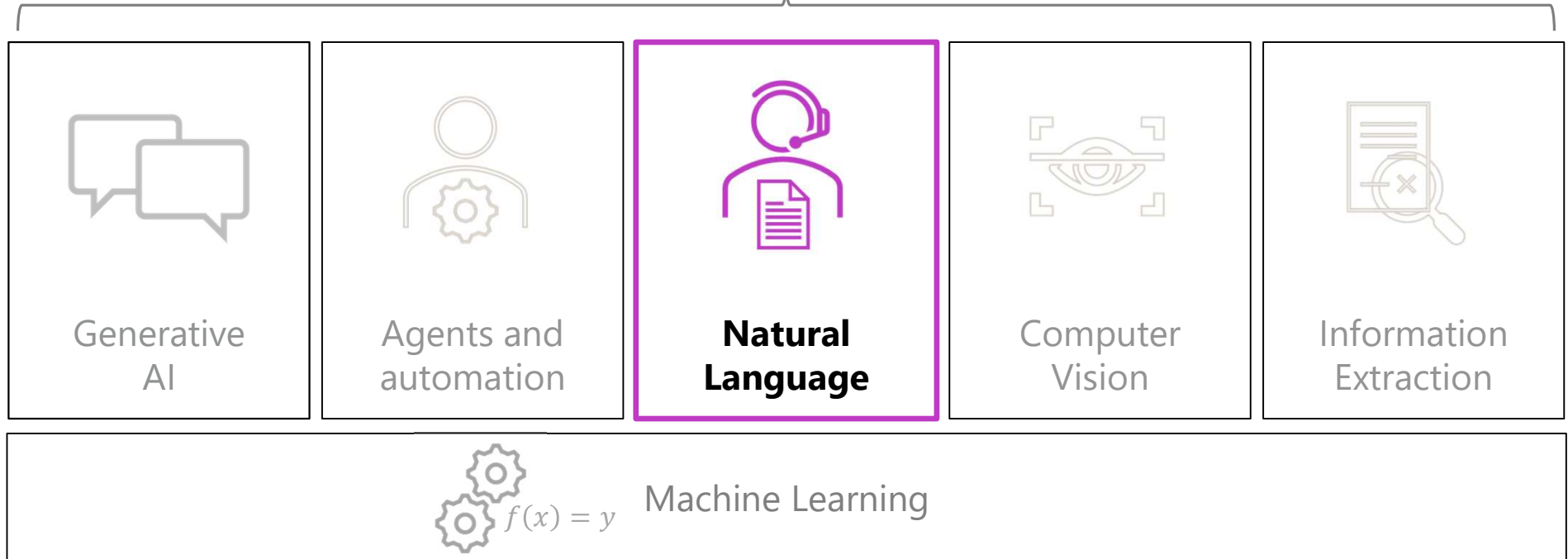




Introduction to AI in Azure: Natural Language Processing



Natural Language Processing in context



Agenda



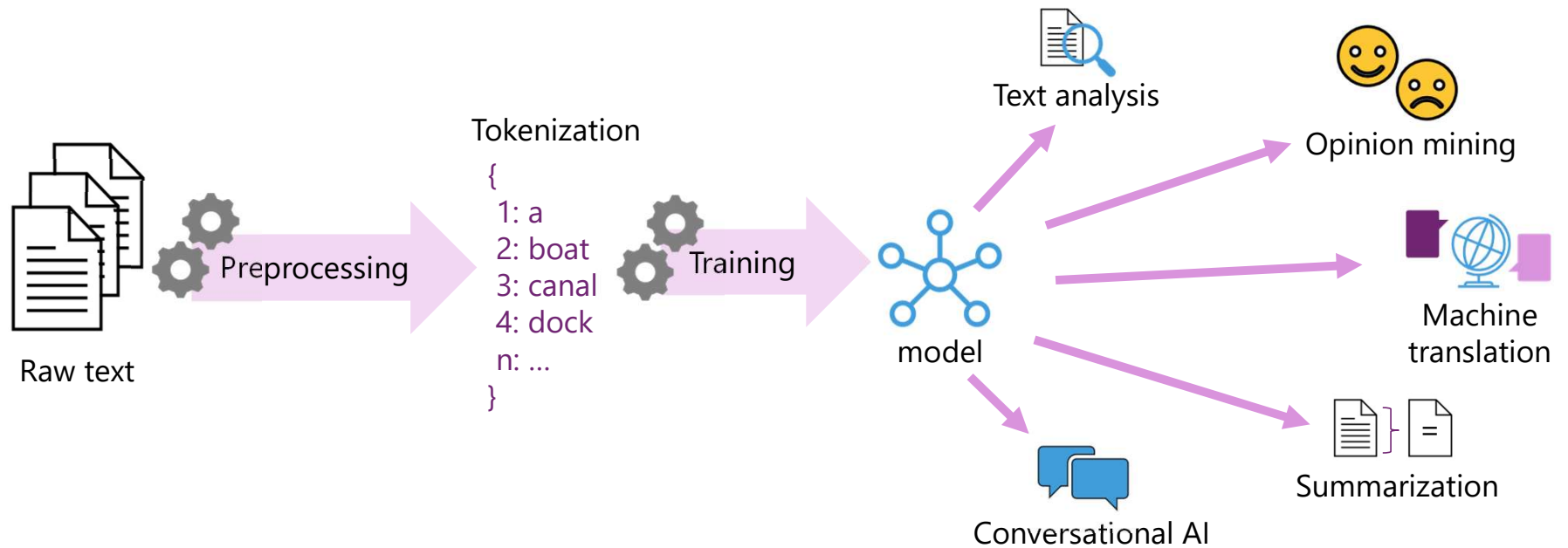
- Introduction to natural language processing concepts
- Get started with natural language processing in Microsoft Foundry
- Get started with speech in Microsoft Foundry

Introduction to natural language processing concepts

<https://aka.ms/mslearn-nlp>





What is natural language processing?







Techniques for language modeling and text analysis

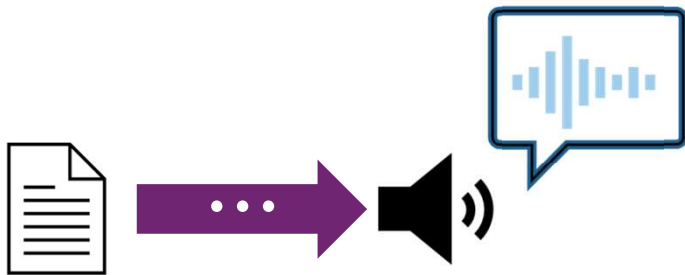
Statistical techniques

-  *Classification*: Use algorithms like Naïve Bayes and Logistic Regression to classify text based on the presence of specific tokens (words). For example, implementing an email spam filter based on terms that often appear in junk mail but not in “regular” email.
-  *Term Frequency / Inverse Document Frequency*: A statistical technique that compares the frequency of a specific term in individual documents with its frequency across a full *corpus* of documents. Used to determine the core *subject* of an individual document

Semantic modeling techniques

-  *Transformer models*: Represent language tokens as vector-based *embeddings* that encapsulate semantic relationships. Related terms have similar vector directions. Used for tasks like *translation* and *next-word-completion*.

-  *Attention*: A technique used in transformer models to improve next-word prediction based on token context. Weights are applied to tokens to reflect their influence on the next word. Using attention in the transformer architecture enables the latest advances in generative AI models.


Speech processing



Speech Synthesis

(Text to speech)

1. *Tokenize* text
2. Map tokens to *phonemes*
3. Generate audio signal



Speech Recognition

(Speech to text)

1. Capture audio signal
2. Break into *phonemes*
3. Map *phonemes* to text *tokens*

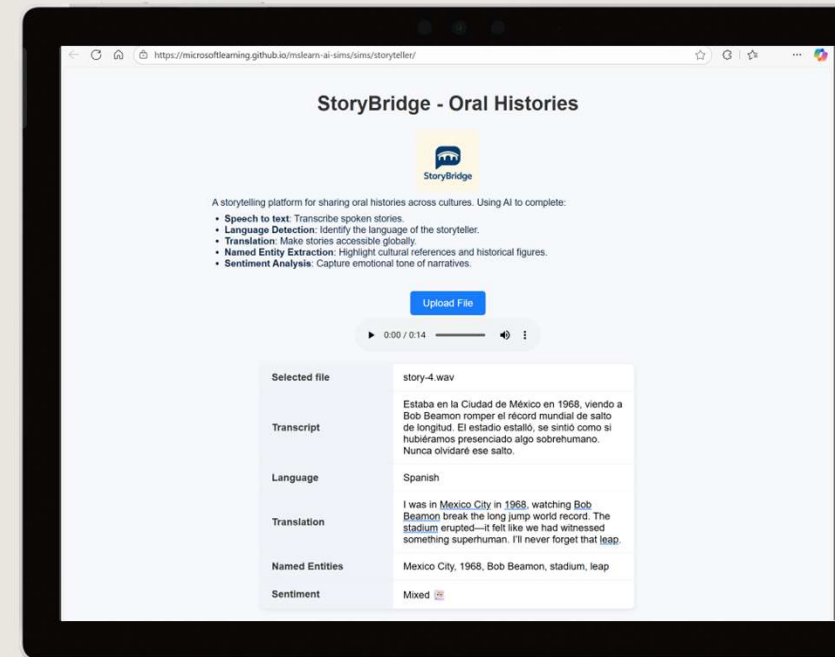
Exercise

Explore natural language processing scenarios

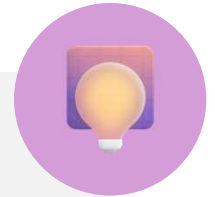
In this exercise, you'll explore solutions that include natural language processing functionality.

Start the exercise at:

<https://go.microsoft.com/fwlink/?linkid=2334225>



Knowledge check



- 1** What is the primary purpose of tokenization in natural language processing (NLP)?
 - ☐ To translate text into another language.
 - ☐ To summarize large documents.
 - ☒ To break down text into smaller units for analysis.

- 2** Which of the following techniques is used to determine the relative importance of words in a document within the context of a larger collection of documents?
 - ☐ Naïve Bayes
 - ☒ TF-IDF (Term Frequency-Inverse Document Frequency)
 - ☐ Word2Vec

- 3** Which of the following best describes the role of *embeddings* in natural language processing (NLP)?
 - ☐ They visualize text data in two-dimensional space for easier interpretation.
 - ☐ They summarize large text corpora into short, meaningful sentences.
 - ☒ They convert language tokens into vectors that capture semantic relationships.

Get started with natural language processing in Microsoft Foundry

<https://aka.ms/mslearn-azure-language>



Language tools in Foundry



Azure Language in Foundry Tools

- Language detection
- Key phrase extraction
- Named entity detection
- Sentiment analysis and opinion mining
- Personal information detection
- Summarization
- ...



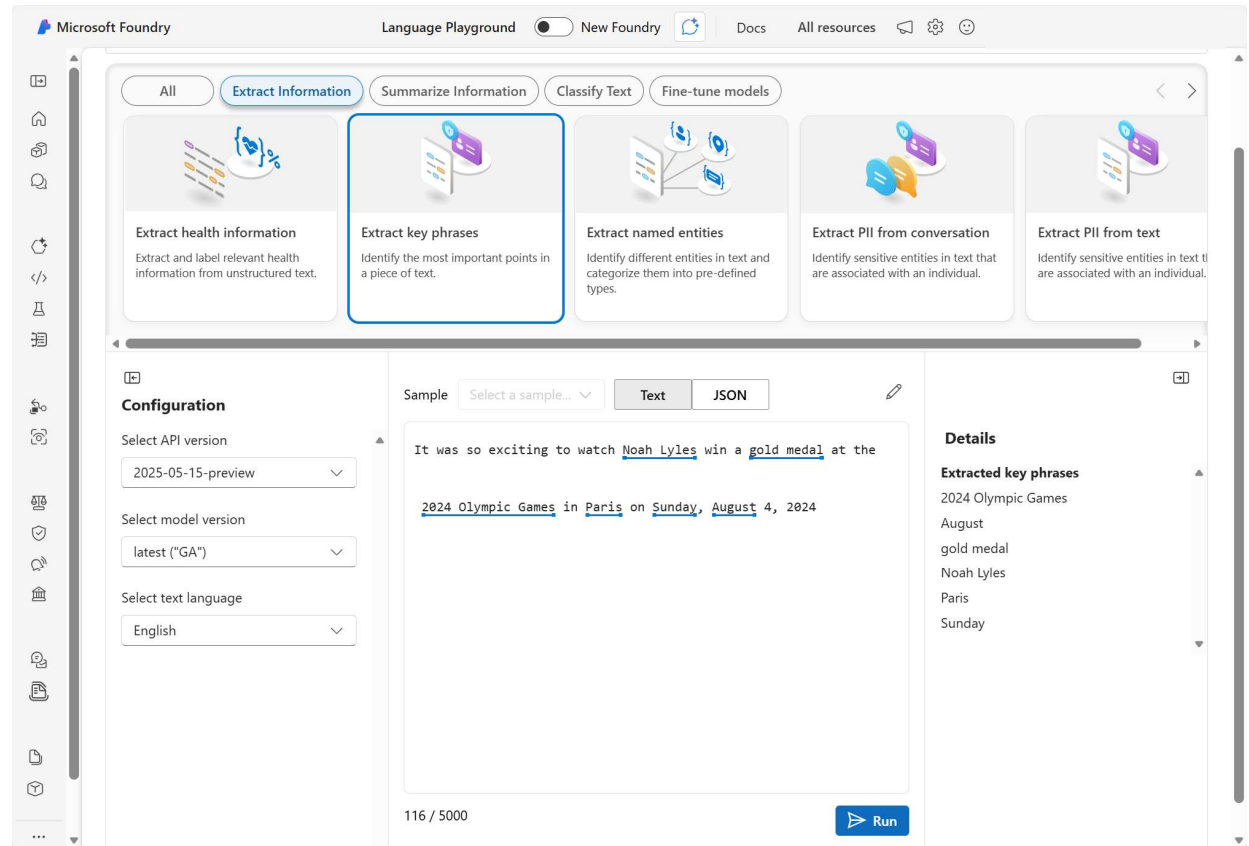
Azure Translator in Foundry Tools

- Text translation
- Document translation
- Custom translation
- ...

Analyzing text

"It was so exciting to watch Noah Lyles win a gold medal at the 2024 Olympic Games in Paris on Sunday, August 4, 2024."

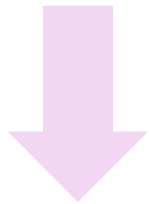
- **Language:** English
- **Sentiment:** Positive
- **Key Phrases:**
 - 2024 Olympic Games
 - gold medal
 - Noah Lyles
 - Paris
 - ...
- **Entities:**
 - *Person:* Noah Lyles
 - *Event:* Olympic Games
 - *City:* Paris
 - *Date:* Sunday, August 4, 2024
 - ...



The screenshot displays the Microsoft Foundry Language Playground interface. The top navigation bar includes the Microsoft Foundry logo, a toggle for 'Language Playground', a 'New Foundry' button, and links to 'Docs' and 'All resources'. The main content area features a horizontal menu with tabs: 'All', 'Extract Information' (selected), 'Summarize Information', 'Classify Text', and 'Fine-tune models'. Below this menu are five cards representing different analysis tasks: 'Extract health information', 'Extract key phrases' (highlighted with a blue border), 'Extract named entities', 'Extract PII from conversation', and 'Extract PII from text'. The 'Extract key phrases' card is active, showing a configuration panel on the left with dropdowns for 'API version' (2025-05-15-preview), 'model version' (latest ("GA")), and 'text language' (English). The main panel displays the sample text: 'It was so exciting to watch Noah Lyles win a gold medal at the 2024 Olympic Games in Paris on Sunday, August 4, 2024'. The text is analyzed, with 'Noah Lyles' and 'gold medal' highlighted in blue. A 'Run' button is at the bottom right. On the right side, a 'Details' panel shows the 'Extracted key phrases': '2024 Olympic Games', 'August', 'gold medal', 'Noah Lyles', 'Paris', and 'Sunday'.

Translating text

"It was so exciting to watch Noah Lyles win a gold medal at the 2024 Olympic Games in Paris on Sunday, August 4, 2024."



"C'était tellement excitant de voir Noah Lyles remporter une médaille d'or aux Jeux olympiques de 2024 à Paris le dimanche 4 août 2024."

The screenshot displays the Microsoft Foundry Translator Playground interface. The top navigation bar includes the Microsoft Foundry logo, a breadcrumb trail (Playgrounds / Translator Playground), a toggle for 'New Foundry', and links to 'Docs' and 'All resources'. The main heading is 'Translator Playground'. Below this, there are links for 'View code' and 'View documentation'. Two main options are presented: 'Text translation' (described as using Azure AI Translator for 130+ languages) and 'Document translation (sync)' (for translating documents from various file types). The 'Text translation' option is selected. The interface is divided into three main sections: 'Configure', 'Original', and 'Translation'. In the 'Configure' section, 'Translate from' is set to 'Auto detect' and 'Translate to' is set to 'French'. The 'Original' section contains the English text: 'It was so exciting to watch Noah Lyles win a gold medal at the 2024 Olympic Games in Paris on Sunday, August 4, 2024'. The 'Translation' section shows the French translation: 'C'était tellement excitant de voir Noah Lyles remporter une médaille d'or aux Jeux Olympiques de 2024 à Paris, le dimanche 4 août 2024'. At the bottom, a character count shows '116 / 1000 Characters' and a blue 'Translate' button is visible.

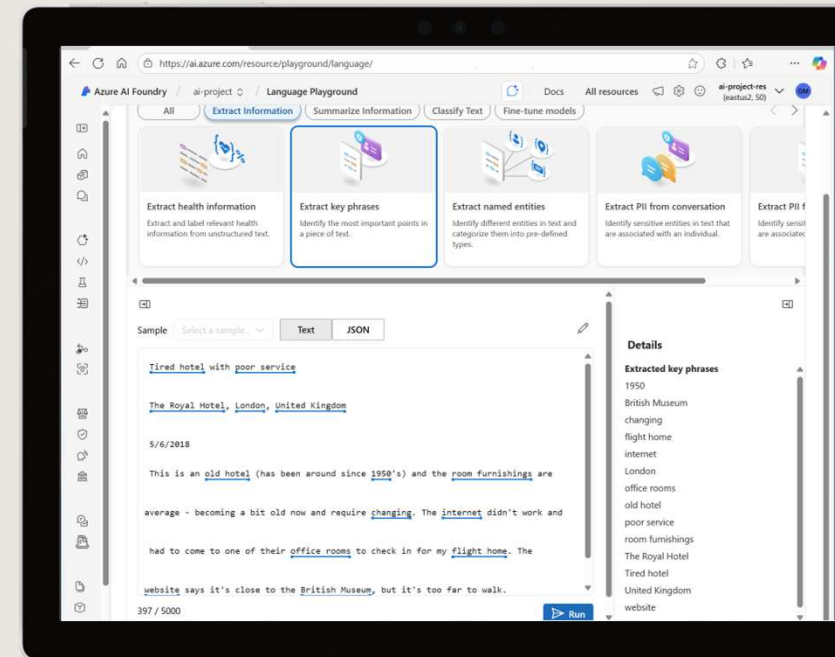
Exercise – If time permits

Analyze text in Microsoft Foundry

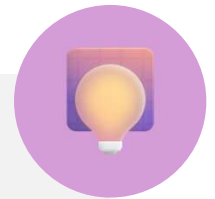
In this exercise, you'll use Microsoft Foundry to explore Azure Language capabilities.

Start the exercise at:

<https://go.microsoft.com/fwlink/?linkid=2250314>



Knowledge check



- 1** What are some capabilities included in Azure Language?
 - ☐ Optical character recognition
 - ☐ Speech recognition
 - ☒ Text summarization, sentiment analysis, named entity detection, key phrase extraction

- 2** You want to use Azure Language to determine the key talking points in a text document. Which feature of the service should you use?
 - ☐ Sentiment analysis
 - ☒ Key phrase extraction
 - ☐ Entity detection

- 3** You want to convert text in English-language emails to Spanish. What service should you use?
 - ☐ Azure Language
 - ☒ Azure Translator
 - ☐ Azure Speech

Get started with speech in Microsoft Foundry

<https://aka.ms/mslearn-azure-speech>



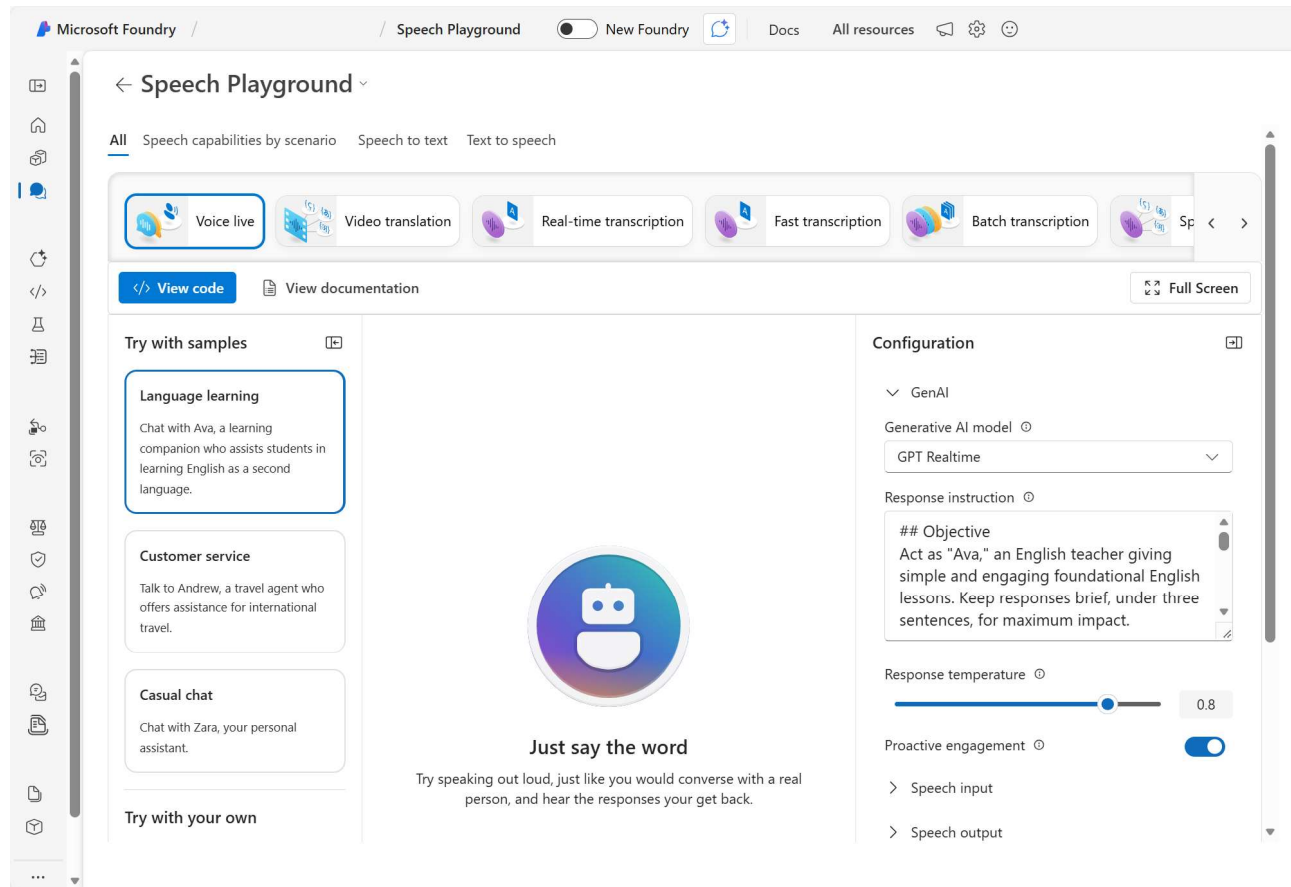
Azure Speech in Foundry Tools



- Speech to text transcription (real-time and batch)
- Text to speech synthesis
- Speech translation
- Custom speech models
- Built-in and custom voices
- Audio content creation
- Video translation
- Voice Live: real-time voice agents
- Built-in and custom avatars
- ...

Speech in Foundry

- Use the *Speech playground* to:
 - Transcribe recorded or live speech
 - Synthesize speech with built-in voices
 - Create custom voices
 - Create custom speech models
 - Add live voice capabilities to an agent
 - Translate audio and video
 - Create avatar-presented videos
 - Create custom avatars
 - ...



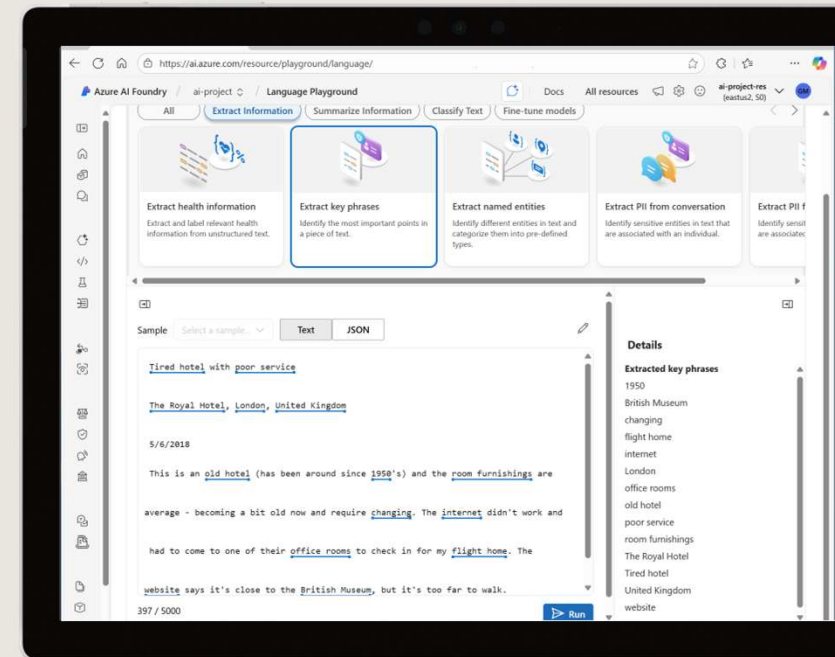
Exercise – If time permits

Explore Speech in Microsoft Foundry

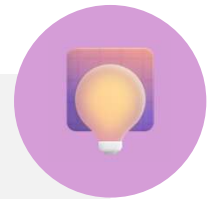
In this exercise, you'll use Microsoft Foundry's speech playground to see speech capabilities in action.

Start the exercise at:

<https://go.microsoft.com/fwlink/?linkid=2250148>



Knowledge check



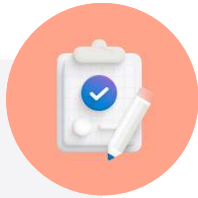
1 You want to build an application that reads incoming email message subjects aloud. Which Azure Speech capability should you use?

- ☐ Speech to text
- ☒ Text to speech
- ☐ Speech translation

2 You want to test various built-in voices to determine which one sounds right for your application. What should you do?

- ☐ Record yourself speaking for 10 seconds and use Azure Speech to create a custom voice.
- ☐ Use the default built-in voice – there is only one.
- ☒ Select voices in the Speech playground in Foundry and use them to generate speech.

Summary



Introduction to natural language processing concepts

- Natural Language Processing (NLP) is used to build solutions that work with text-based or speech-based language
- NLP capabilities have evolved from simple statistical techniques to modern semantic language models

Get started with natural language processing in Microsoft Foundry

- Use Azure Language to analyze text and extract information
- Use Azure Translator to translate text

Get started with speech in Microsoft Foundry

- Use Azure Speech to synthesize, transcribe, and translate speech; add live voice capabilities to agents, and to generate avatar-presented video