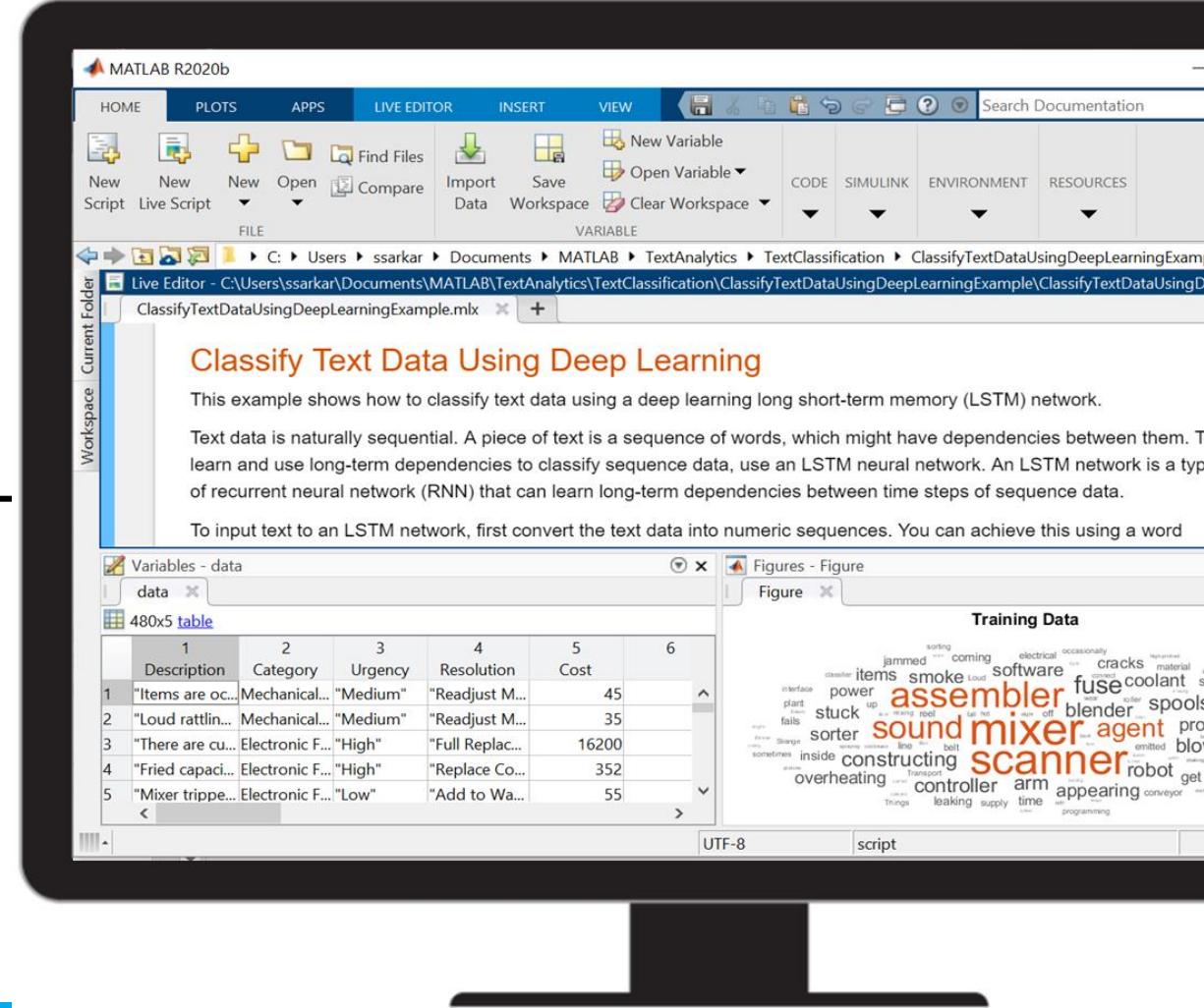


# Using MATLAB for NLP with Text analytics



**Kantika Wongkasem**  
**Application Engineer**  
**Ascendas Systems Co.,Ltd**  
**Kantika@ascendas-asis.com**



The screenshot shows the MATLAB R2020b interface. The Live Editor window displays the code for 'ClassifyTextDataUsingDeepLearningExample.mlx'. The code is a script titled 'Classify Text Data Using Deep Learning' which demonstrates how to classify text data using an LSTM network. It includes a table named 'data' with 5 rows and 6 columns, and a 'Training Data' section with a list of words.

|   | Description      | Category        | Urgency  | Resolution      | Cost  |
|---|------------------|-----------------|----------|-----------------|-------|
| 1 | "Items are oc... | Mechanical...   | "Medium" | "Readjust M...  | 45    |
| 2 | "Loud rattlin... | Mechanical...   | "Medium" | "Readjust M...  | 35    |
| 3 | "There are cu... | Electronic F... | "High"   | "Full Replac... | 16200 |
| 4 | "Fried capaci... | Electronic F... | "High"   | "Replace Co...  | 352   |
| 5 | "Mixer tripp...  | Electronic F... | "Low"    | "Add to Wa..."  | 55    |

Training Data

- jammed
- coming
- electrical
- occasionally
- cracks
- material
- interface
- power
- smoke
- software
- coolant
- stuck
- up
- blender
- spools
- assembler
- sorter
- sound
- mixer
- agent
- scanner
- robot
- leaking
- supply
- time
- appearing
- conveyor
- programming

# REMINDERS



Turn off your cameras



Mute your microphones



This session will NOT be recorded



# Agenda

## Topics

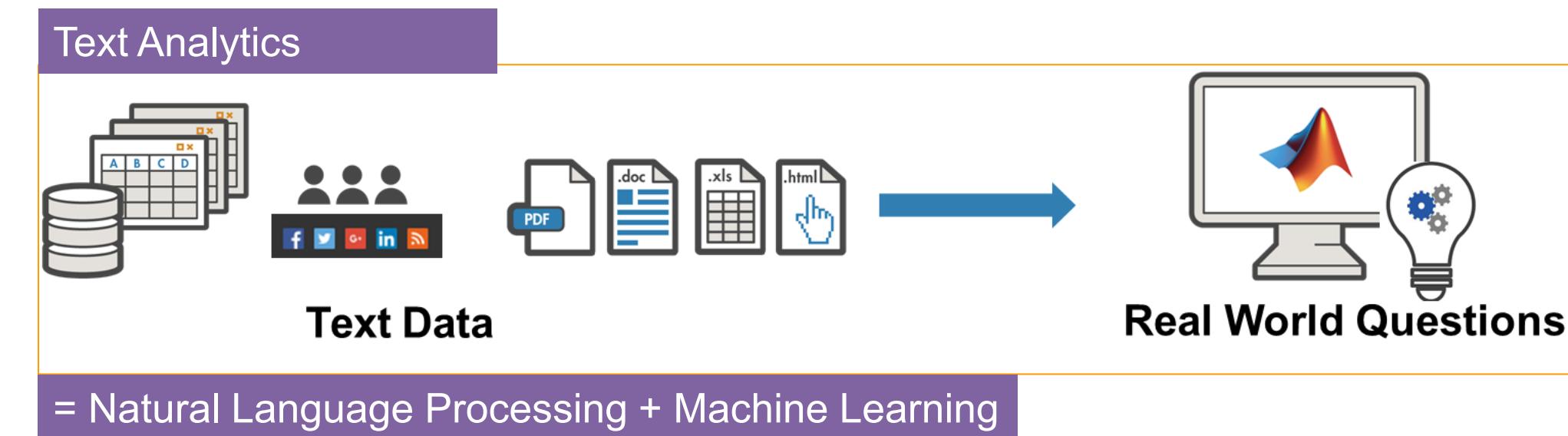
Introduction to Live Script – Low Code in MATLAB

Introduction to Natural Language Processing(NLP) and  
Text analytics in MATLAB

Practical example: Classifying text data using LSTM networks

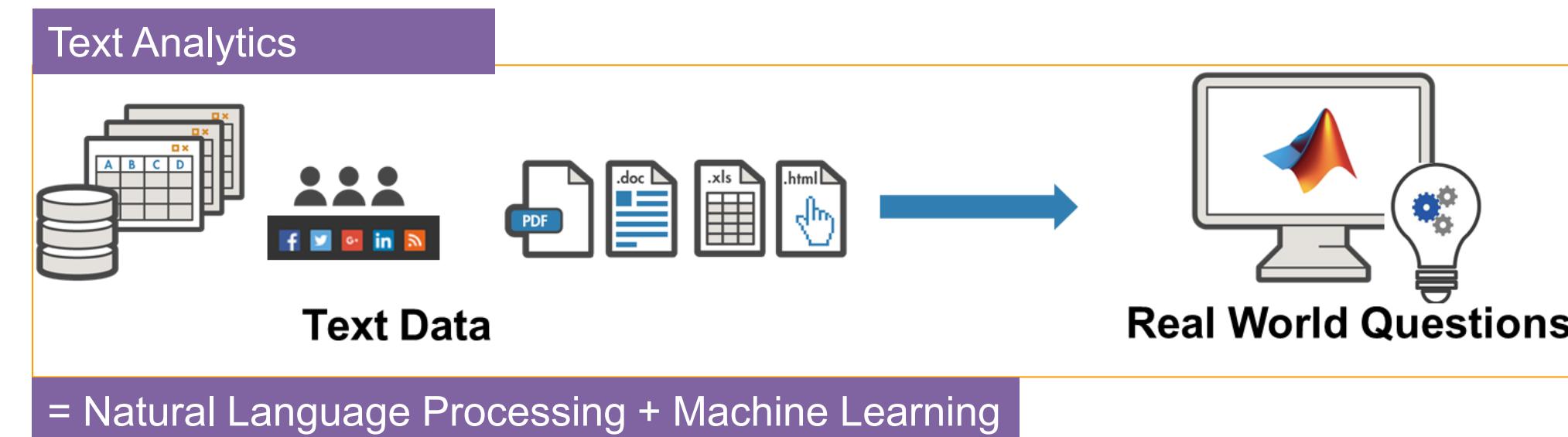
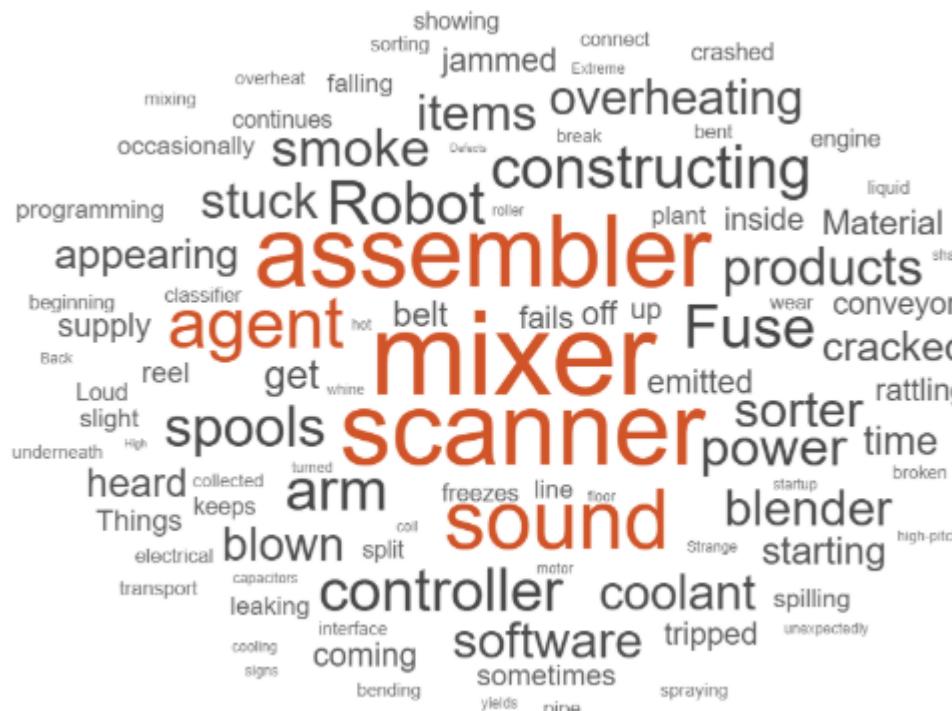
Leveraging LLMs for enhanced AI workflows and rapid prototyping

Summary



# Agenda

- Introduction to Live Script – Low Code in MATLAB
- Introduction to NLP and text analytics in MATLAB
- Practical example: Classifying text data using LSTM networks
- Leveraging LLMs for enhanced AI workflows and rapid prototyping
- Interactive Q&A and real-world applications



# Agenda

- Introduction to Live Script – Low Code in MATLAB
  - Introduction to NLP and text analytics in MATLAB.
  - Practical example: Classifying text data using LSTM networks.
  - Leveraging LLMs for enhanced AI workflows and rapid prototyping.
  - Interactive Q&A and real-world applications.

MATLAB Online

MATLAB Online

Use MATLAB and Simulink through your web browser

Start using MATLAB Online

MATLAB Online is available with select licenses.  
[Check your eligibility](#)

Collaborate using projects



Use MATLAB and Simulink with no downloads or installations.



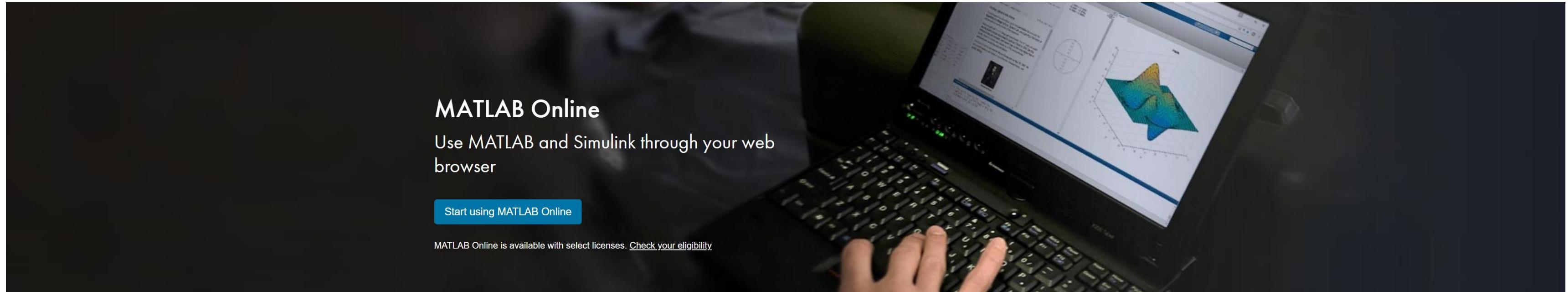
Collaborate with others through online sharing and publishing



Store, manage, and access your files anywhere.

All named academic, commercial and home user accounts are eligible

## Access MATLAB from your browser – MATLAB & Simulink Online



- No installation
- Collaborate over your browser
- Synchronize with cloud data (MATLAB Drive)
- Host your own MATLAB Online

<https://www.mathworks.com/products/matlab-online.html>



Online



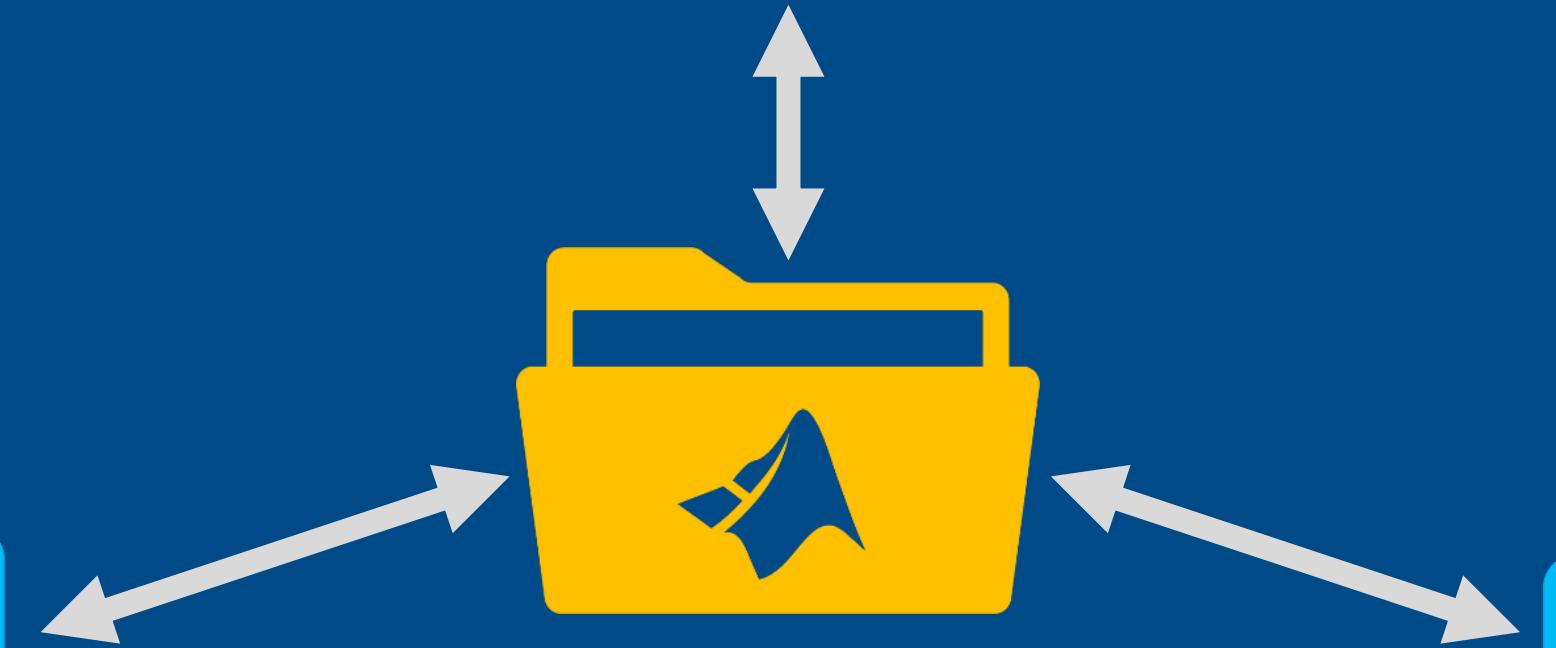
Desktop



Drive

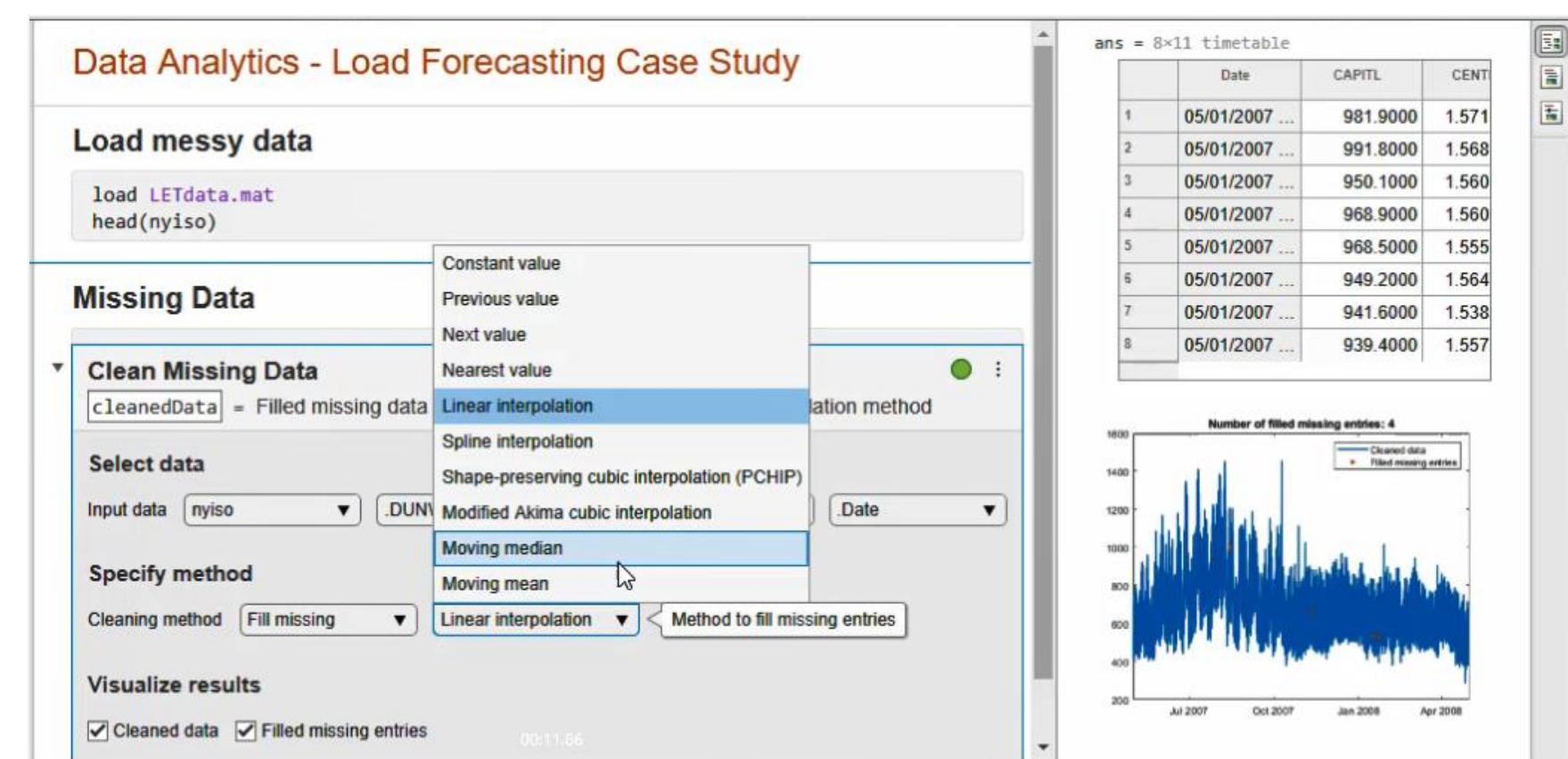
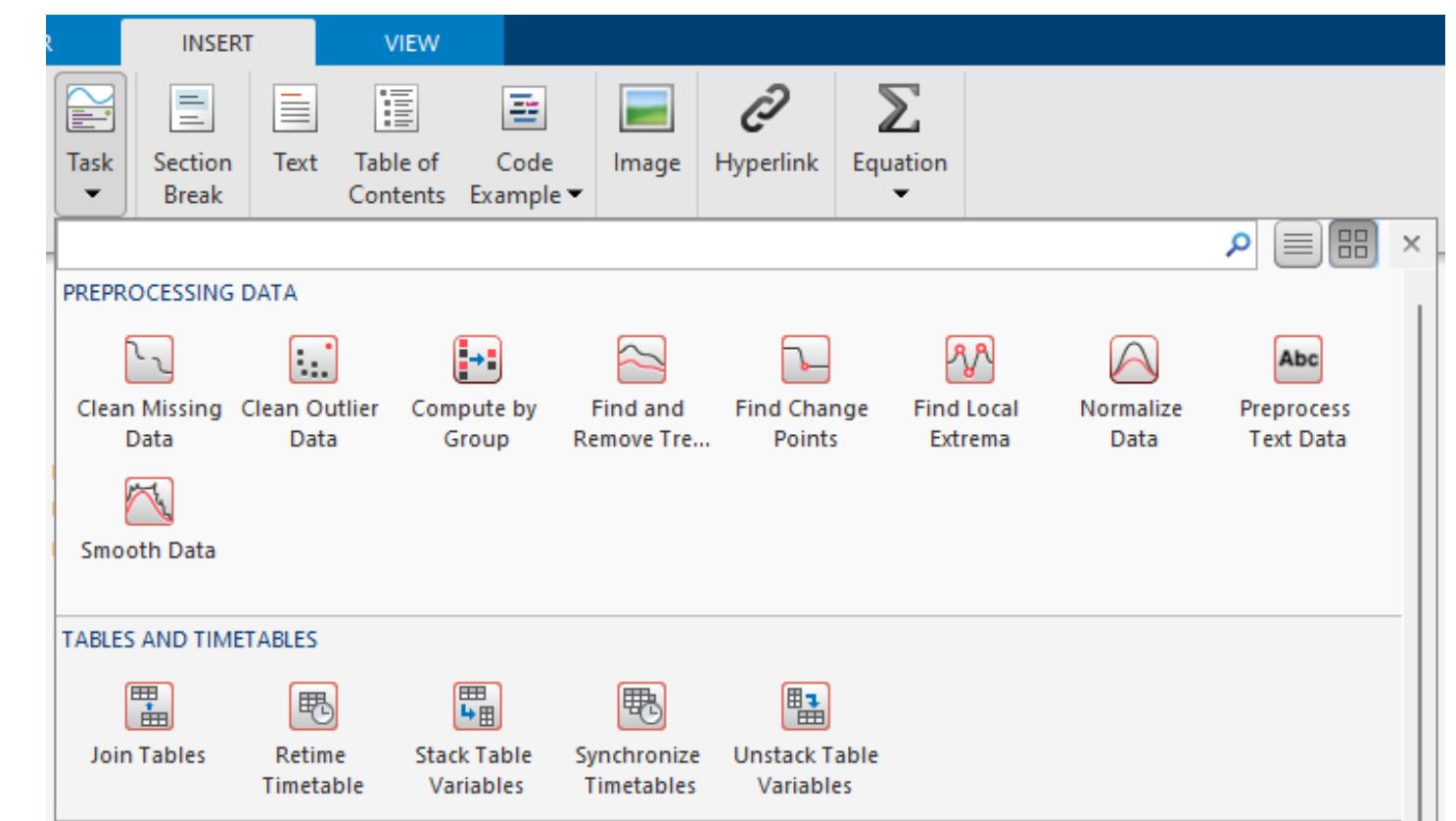


Mobile



# Program – without coding

- Tasks are apps that can be embedded in scripts
- Automatically generate the corresponding MATLAB code
- Save the task as part of the script for subsequent use by others
- Author custom Tasks
- Specify which code sections to run when control value changes
- New Tasks added each release



# There are many Live Editor tasks – with more available each release

## DATA AND VISUALIZATION



Create Plot

## DATA PREPROCESSING



Clean Missing Data



Clean Outlier Data



Compute by Group



Find Change Points



Find Local Extrema



Normalize Data



Remove Trends



Smooth Data

## TABLES AND TIMETABLES



Join Tables



Retime Timetable



Stack Table Variables



Synchronize Timetables



Unstack Table Variables

## OPTIMIZATION



Optimize

## IMAGE ACQUISITION



Acquire Webcam Im...

## Live Tasks in MATLAB

## CONTROL SYSTEM DESIGN AND ANALYSIS



Convert Model Rate



Reduce Model Order



Tune PID Controller

## PREDICTIVE MAINTENANCE



Estimate Approximat...



Estimate Correlation ...



Estimate Lyapunov E...



Extract Spectral Fea...



Reconstruct Phase Space

## SYSTEM IDENTIFICATION



Estimate Process Model



Estimate Spectral Mo...



Estimate State-Space...

## SIGNAL PROCESSING AND COMMUNICATIONS



Design Filter



Extract Audio Features

## SYMBOLIC MATH



Simplify Symbolic Ex...



Solve Symbolic Eq...

## STATISTICS AND MACHINE LEARNING



Cluster Data

## COMPUTATIONAL FINANCE



Threshold Predictors

Live Tasks in Add-on Toolboxes

## Interactively explore and choose plots in a script – without writing code

**Create Plot**

`s = scatter of Age and Diastolic`

**Select visualization**

Search for a visualization Filter by Category All

plot surf plot3 scatter bubblechart swarmchart bar barh histogram contour semilogy semilogx stem mesh loglog quiver

**Select data**

X Age ▼

Y Diastolic ▼

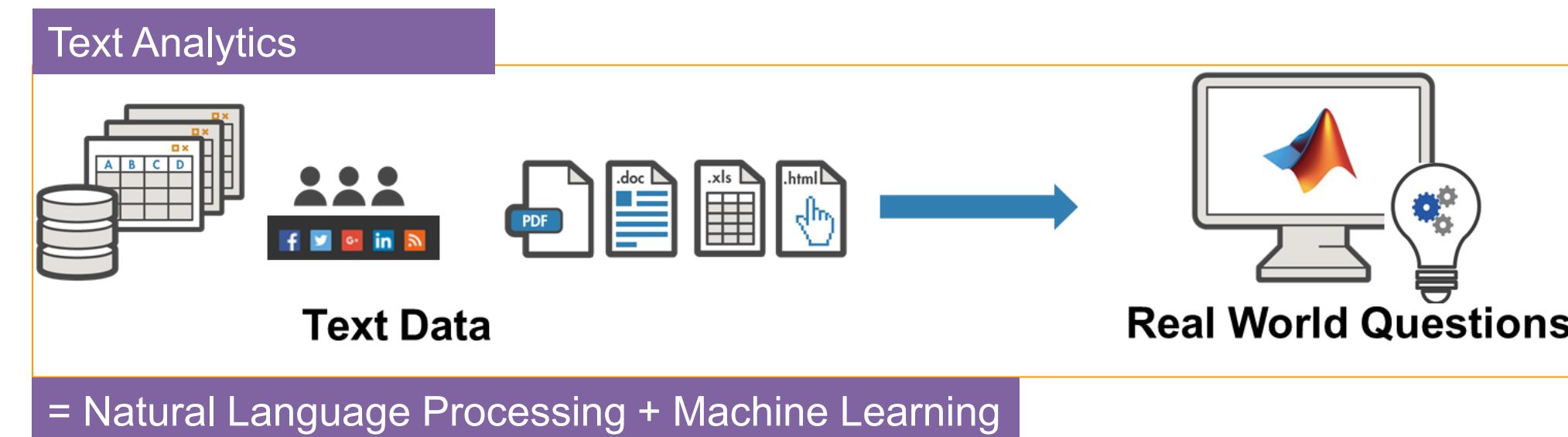
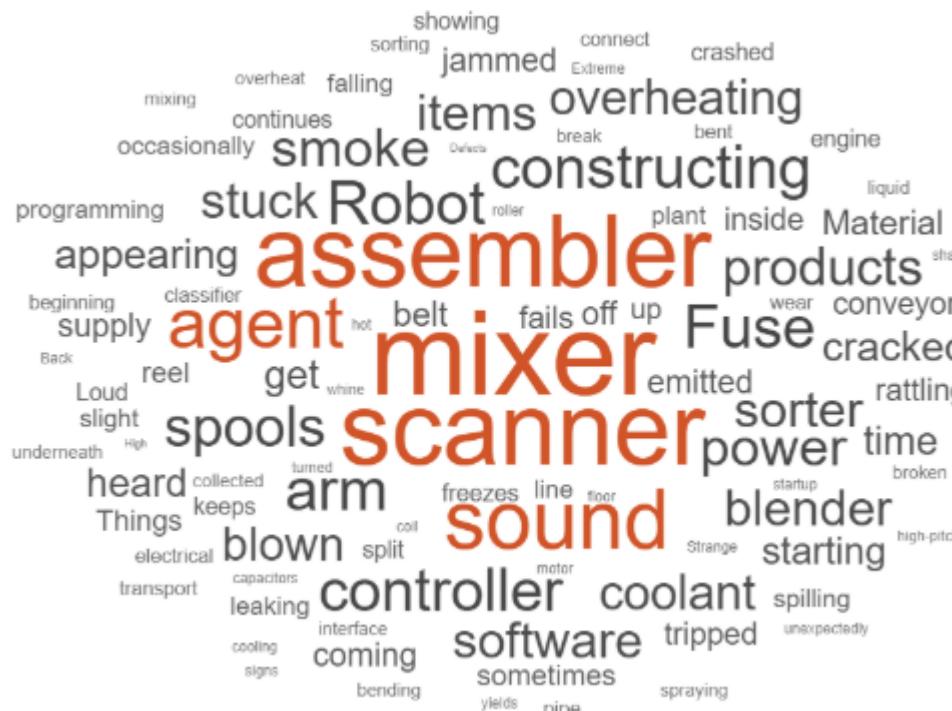
Size default ▼

Color default ▼

**Select optional visualization parameters**

Marker symbol ▼ + ▼ - +

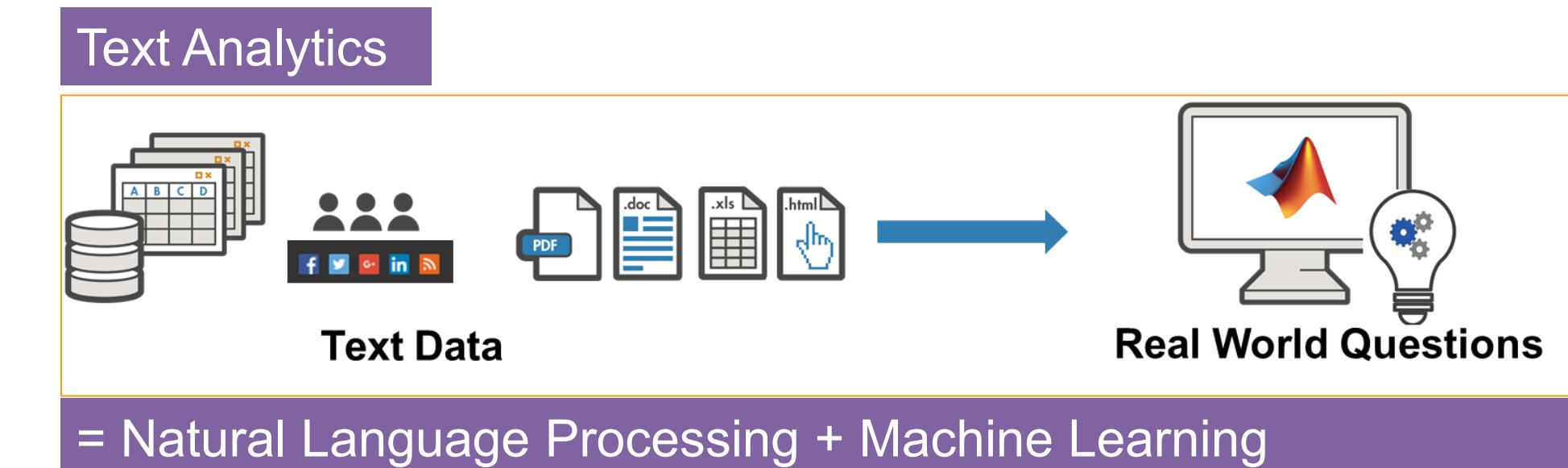
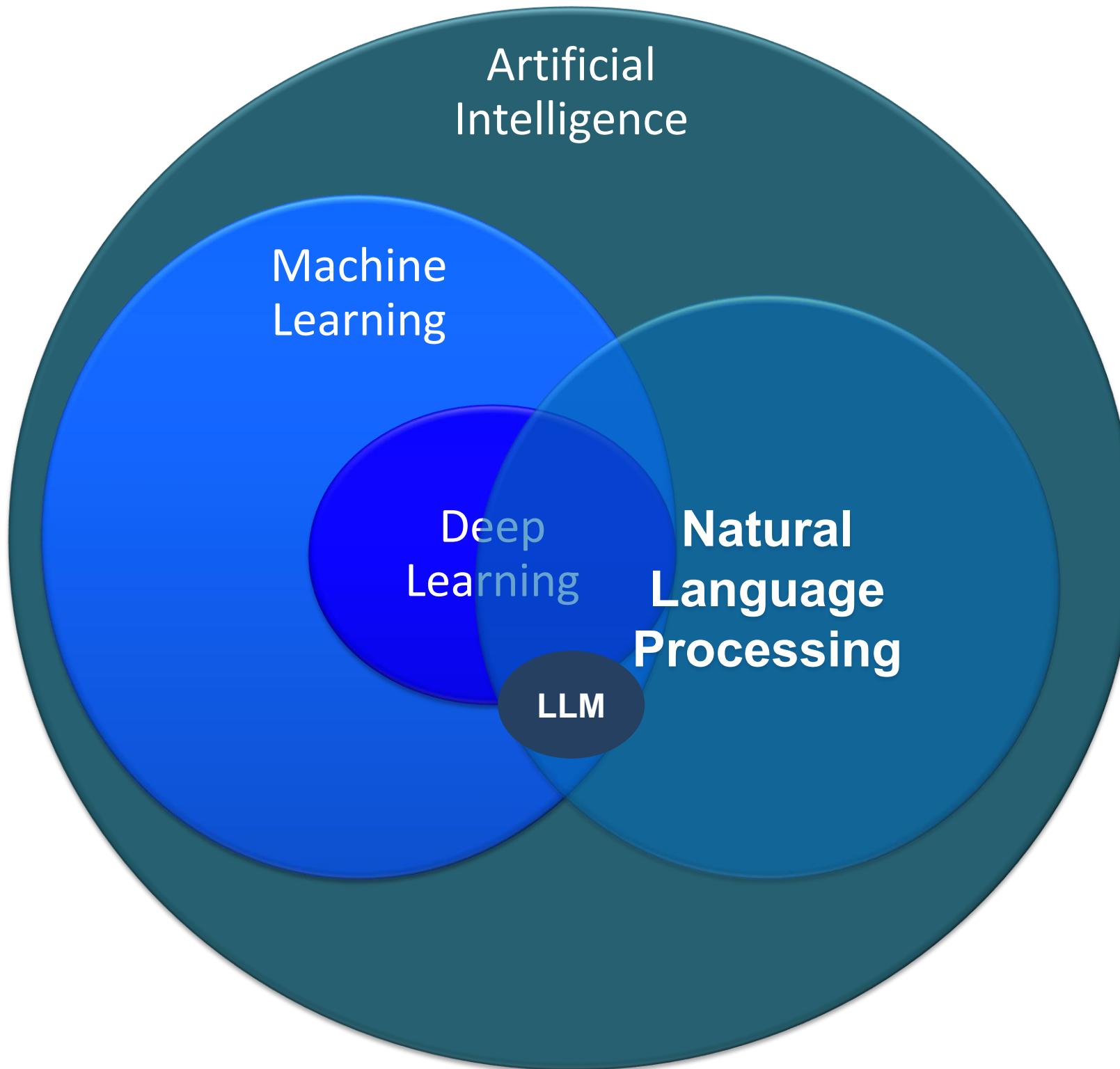
Create Plot Live Task



# Agenda

- Introduction to Live Script – Low Code in MATLAB
  - Introduction to NLP and text analytics in MATLAB
  - Practical example: Classifying text data using LSTM networks
  - Leveraging LLMs for enhanced AI workflows and rapid prototyping
  - Interactive Q&A and real-world applications

# What is Natural Language Processing? Text Analytics?



Please download and install the Slido app on all computers you use.

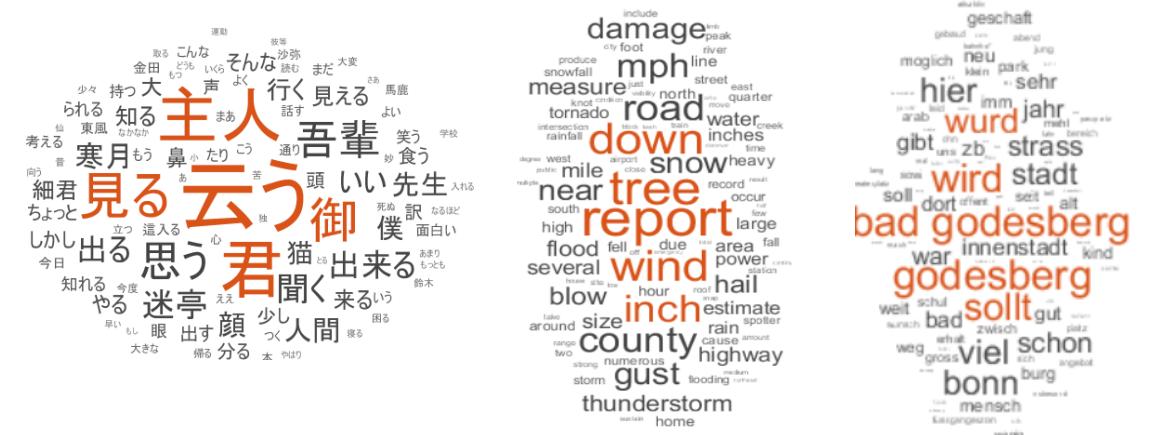


**What type of data do you primarily use or plan to use for creating AI applications?**

ⓘ Start presenting to display the poll results on this slide.

# What Makes Text Analytics Difficult?

Many languages, many words in a language, same word different meanings, dialects



Machines understand logic.. Human beings not so logical

*If you are a friend of mine  
and you want to go  
bowling, what would I want  
to do?*



Ambiguity, emotion, subjectivity, personality, culture

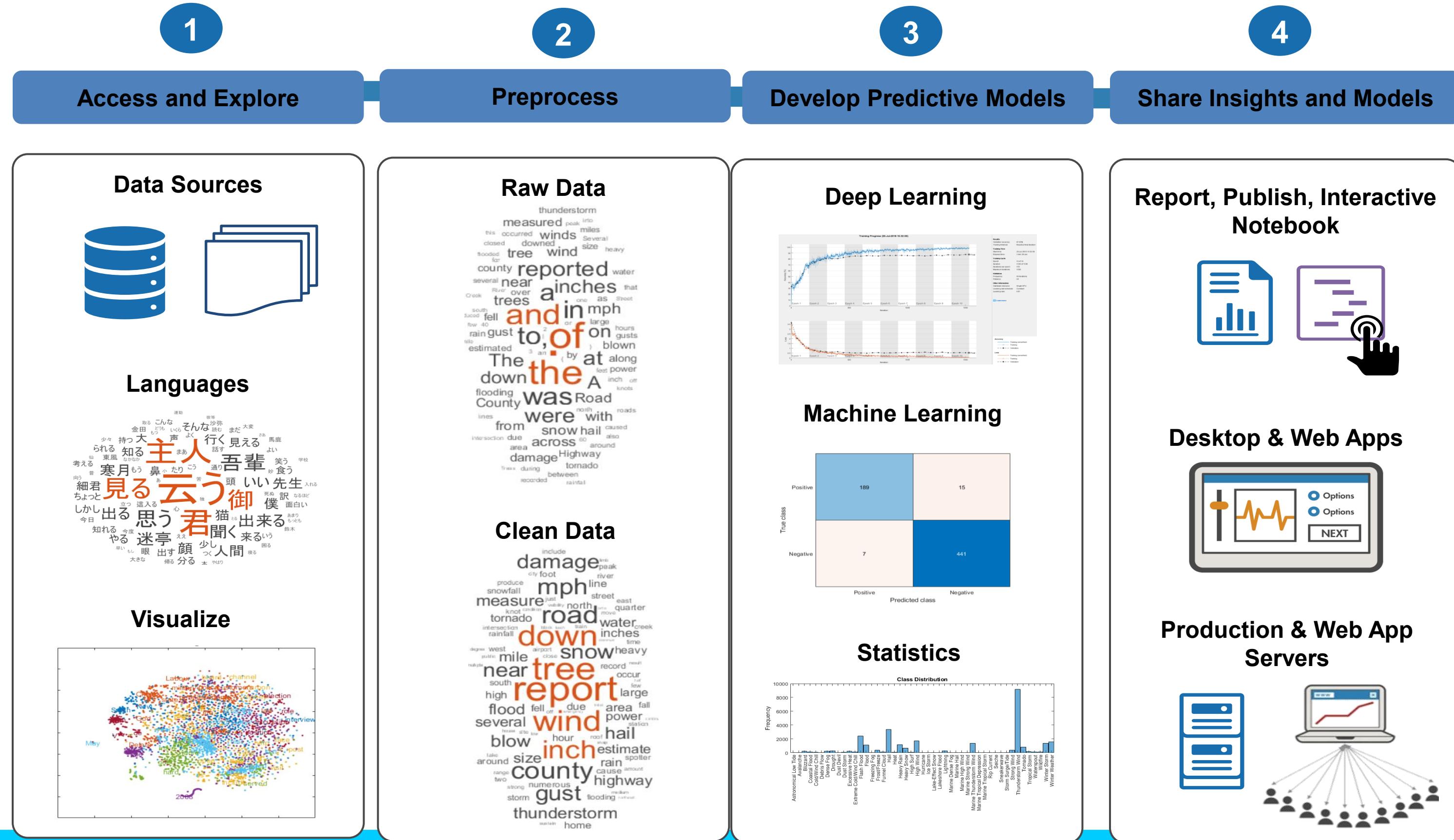
...

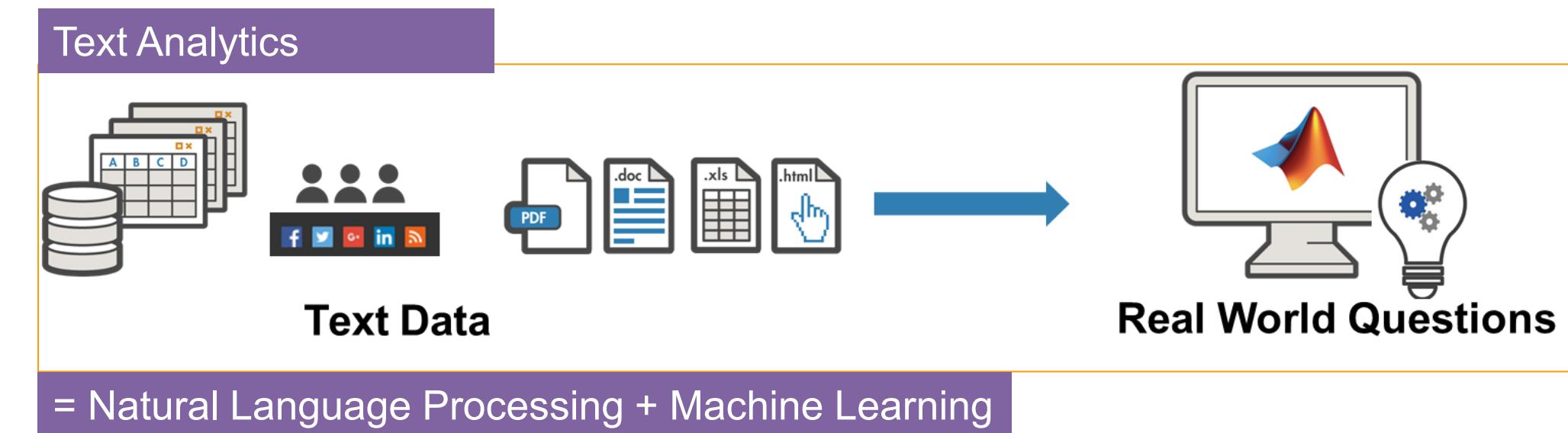
*I had a bat while growing up.*

The animal?  
As a pet?

With which  
you hit a ball?

# Text Analytics Workflow





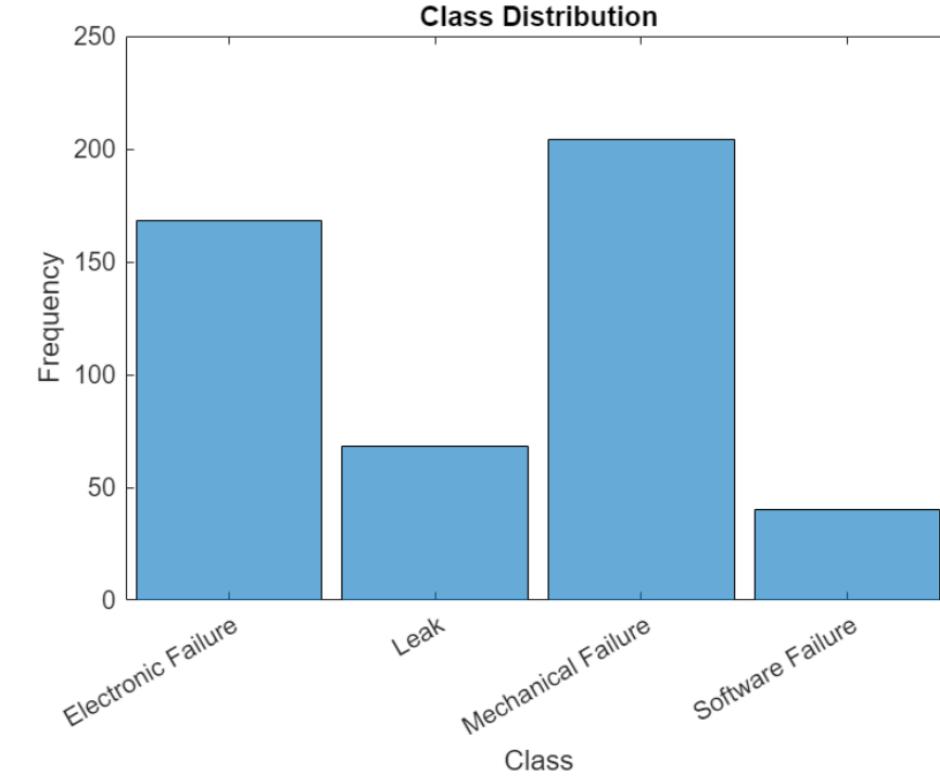
# Agenda

- Introduction to Live Script – Low Code in MATLAB
- Introduction to NLP and text analytics in MATLAB
- Practical example: Classifying text data using LSTM networks
- Leveraging LLMs for enhanced AI workflows and rapid prototyping
- Interactive Q&A and real-world applications

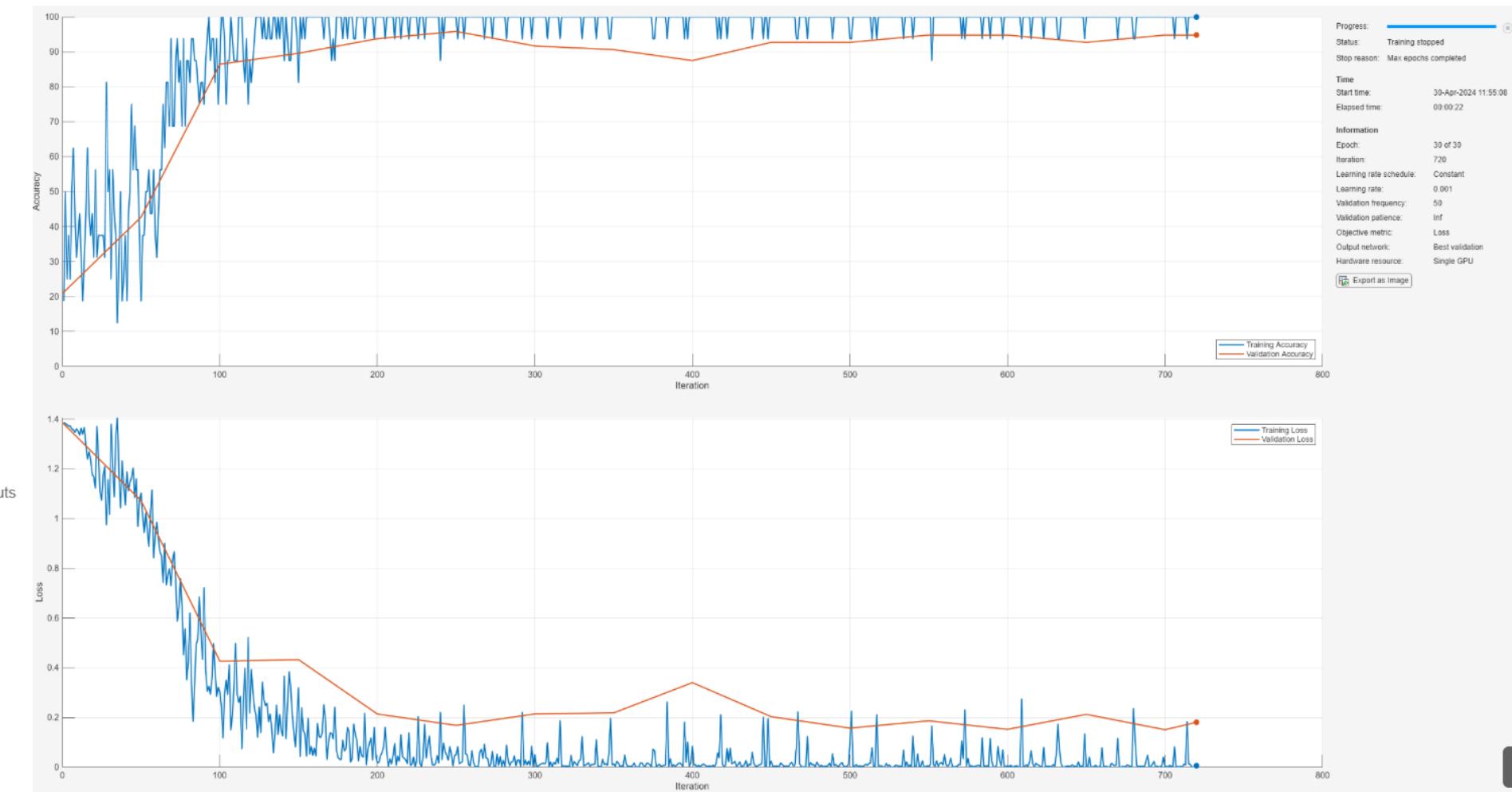
# Classify Text Data Using Deep Learning

This data contains labeled textual descriptions of factory events.

## Class Distribution



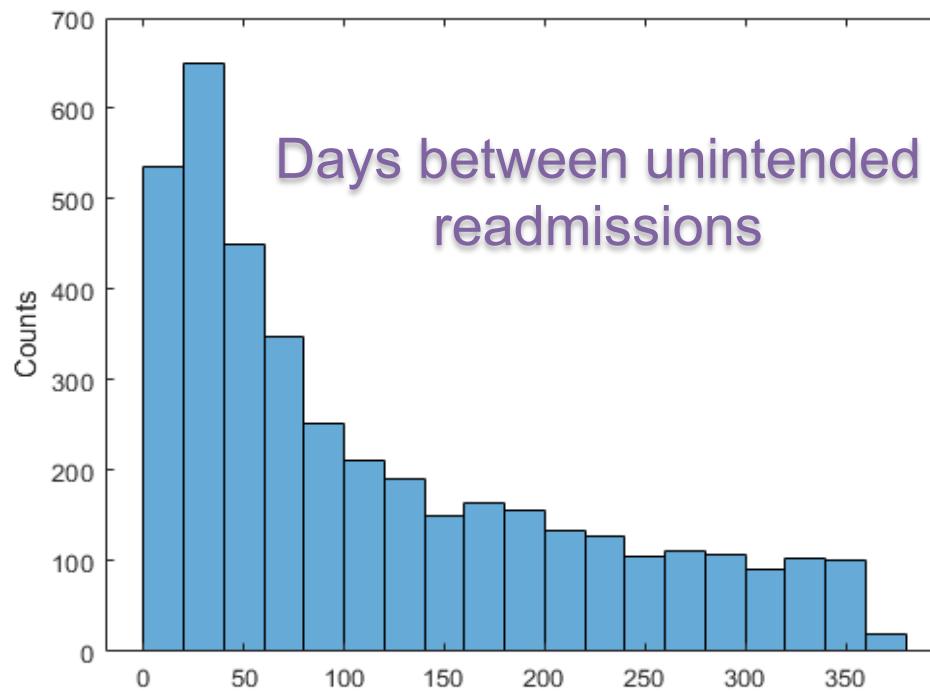
Train the LSTM network using the `trainnet` function.



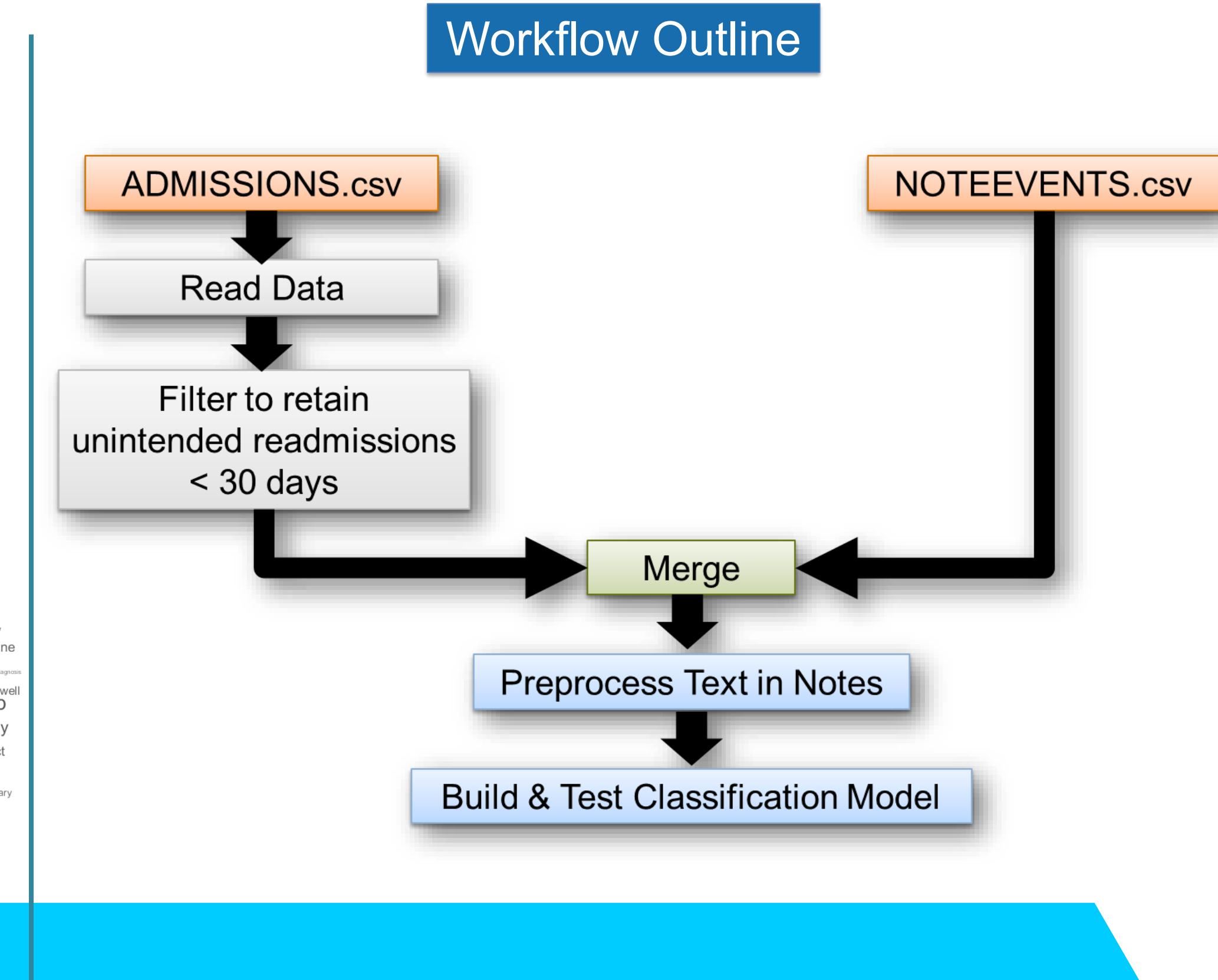
# Classify Text Data Using Deep Learning

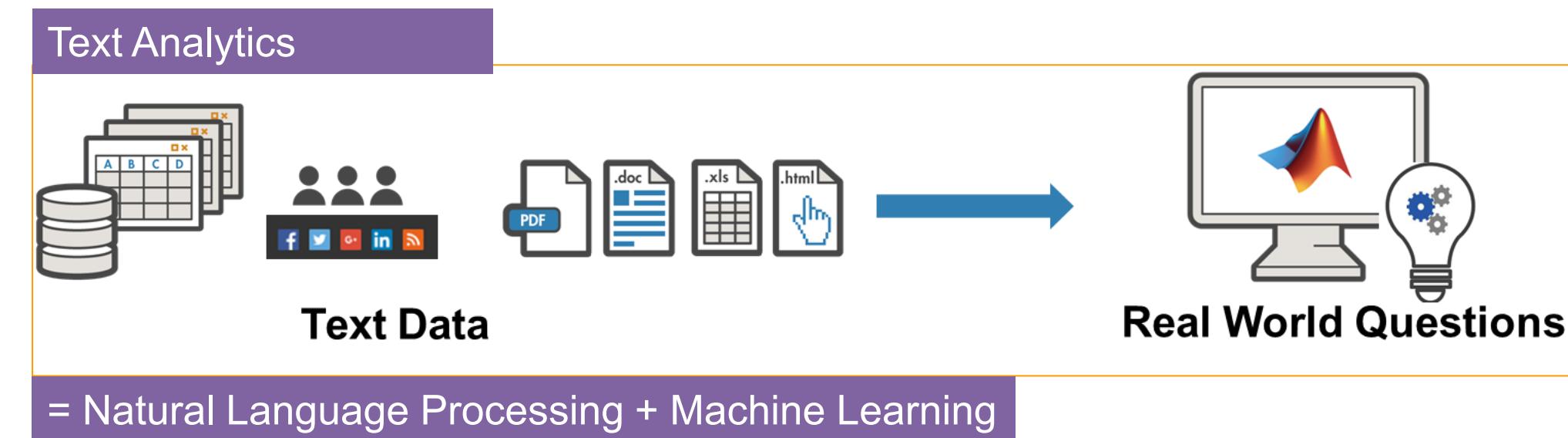
# Unintended Hospital Readmission Prediction

## *Classification Problem*



right patient leave continue assessment respiratory today effusion examination heart





# Agenda

- Introduction to Live Script – Low Code in MATLAB
- Introduction to NLP and text analytics in MATLAB
- Practical example: Classifying text data using LSTM networks
- Leveraging LLMs for enhanced AI workflows and rapid prototyping
- Interactive Q&A and real-world applications

# Using NLP and LLMs in text workflows

## *NLP + Traditional Machine/Deep Learning*

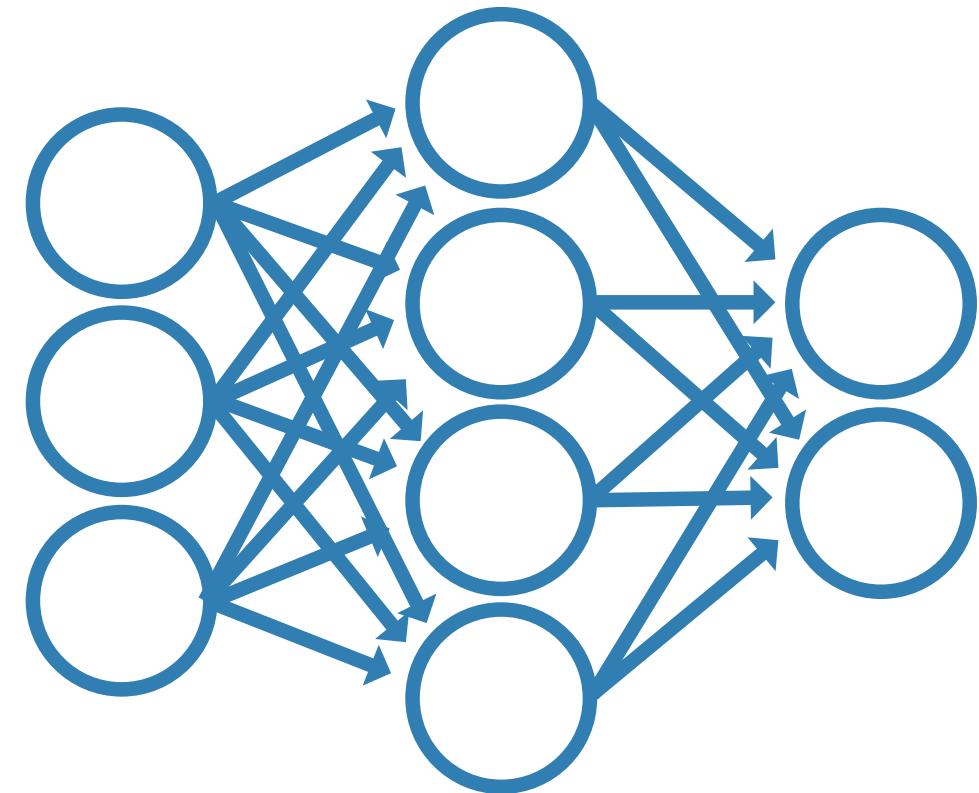
Bag-of-words, TF-IDF for  
Multiclass linear classification

## *LLMs*

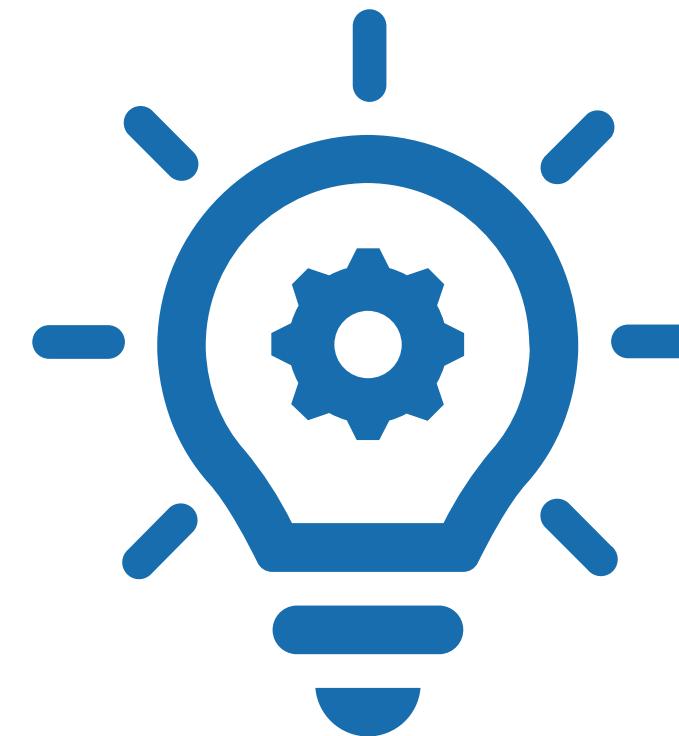
ChatGPT or BERT for  
summarization

What are LLMs?  
What can they do?  
How do we get these?  
How do we use these?

# Understanding LLMs is important to realize their potential



Large language models (or LLMs) are a type of deep learning model



Trained on huge amounts of data



Networks with millions to trillions of parameters

# LLMs can help you solve specific problems

## ***Text Generation***

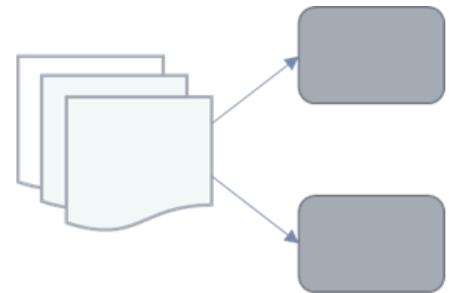


Write Code



Document

## ***Text Classification***

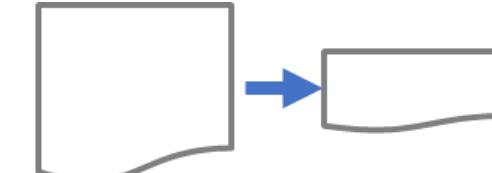


Classify Maintenance Documents

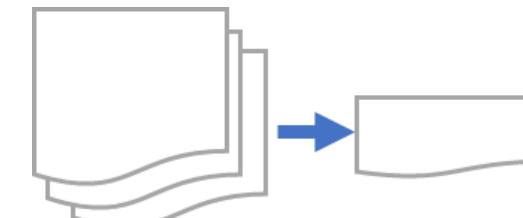


Analyze Sentiment

## ***Summarization***



One document



Multiple documents

## ***Information Retrieval***



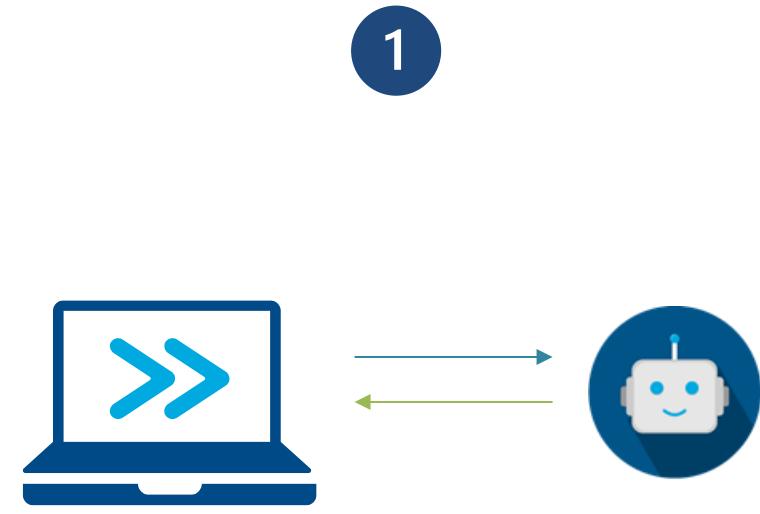
Scientific Discovery

- X
- ✓

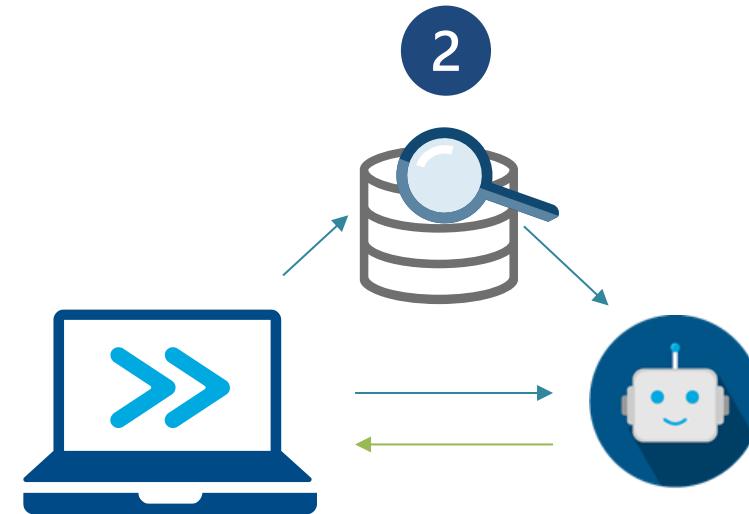
Requirements for design & engineering

..... and much more ....

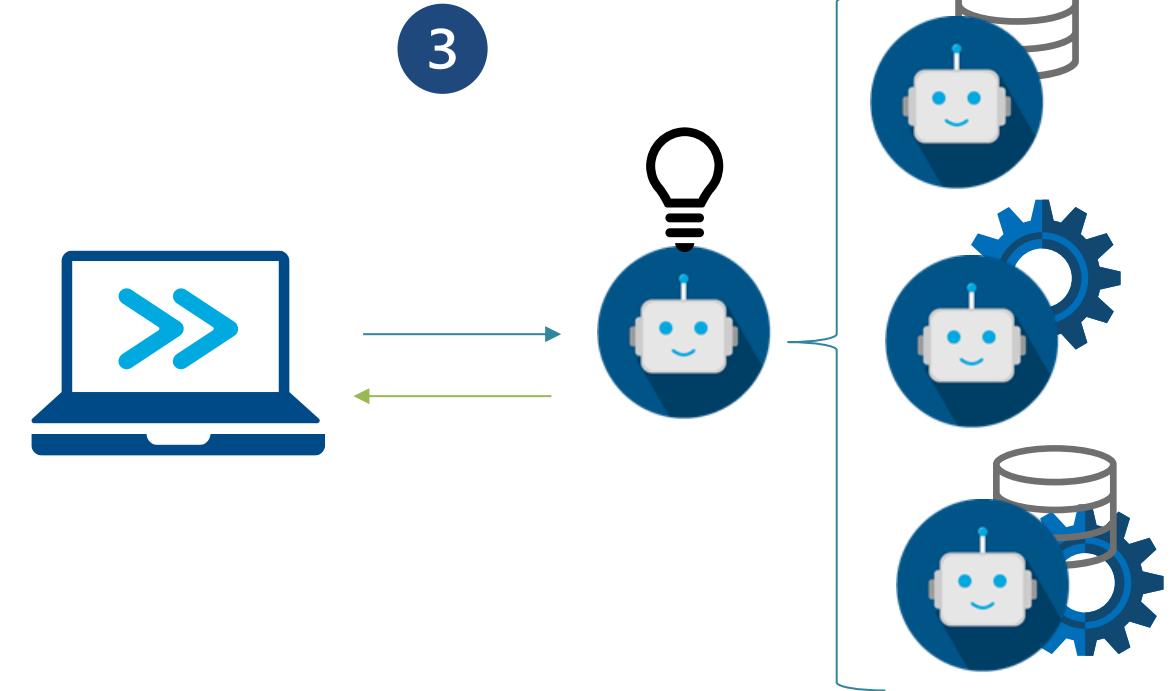
# Incorporating LLMs in your workflow



Prompt Engineering



Retrieval-Augmented Generation



Continue pretraining or fine-tune

# Prompt Engineering using Ollama

## Chatbot Using ollama

llama3



```
Command Prompt - ollama run llama3
Microsoft Windows [Version 10.0.19045.5487]
(c) Microsoft Corporation. All rights reserved.

C:\Users\KantikaWongkasem>ollama run llama3
pulling manifest
pulling 6a0746a1ec1a... 100% [██████████] 4.7 GB
pulling 4fa551d4f938... 100% [██████████] 12 KB
pulling 8ab4849b038c... 100% [██████████] 254 B
pulling 577073ffcc6c... 100% [██████████] 110 B
pulling 3f8eb4da87fa... 100% [██████████] 485 B
verifying sha256 digest
writing manifest
success
>>> you are a helpful assistant
I'm thrilled to be your helpful assistant! I'll do my best to assist you with any questions, tasks, or problems you have. Whether it's providing information, offering suggestions, or simply being a listening ear, I'm here for you.

What can I help you with today? Do you have a specific question, project, or goal in mind that you'd like some assistance with?

>>> Send a message (/? for help)
```

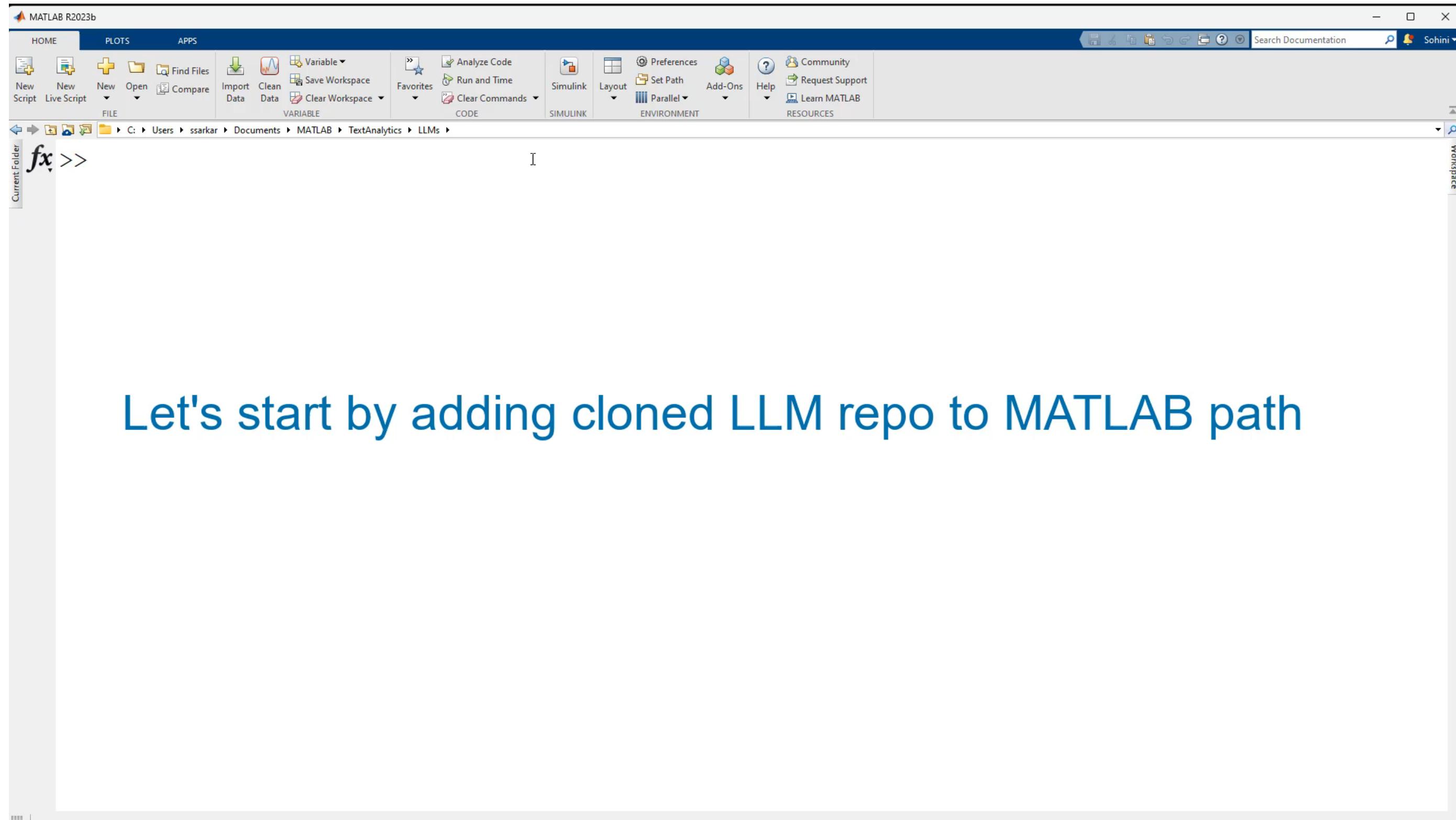
```
1 chat = ollamaChat("deepseek-r1","You are a helpful assistant I'm happy to talk with you");
2 generate(chat,"Hello, good afternoon!")

ans =
<think>
Alright, so the user greeted me earlier and said "Good afternoon!" Now, they're asking how I can assist them. Hmm, it's ju
I should respond warmly and encourage them to ask anything they need help with. Maybe add an emoji to keep the tone light .
</think>

Good afternoon! How can I assist you today? ☺"
```

[Large Language Models \(LLMs\) with MATLAB - File Exchange - MATLAB Central](#)

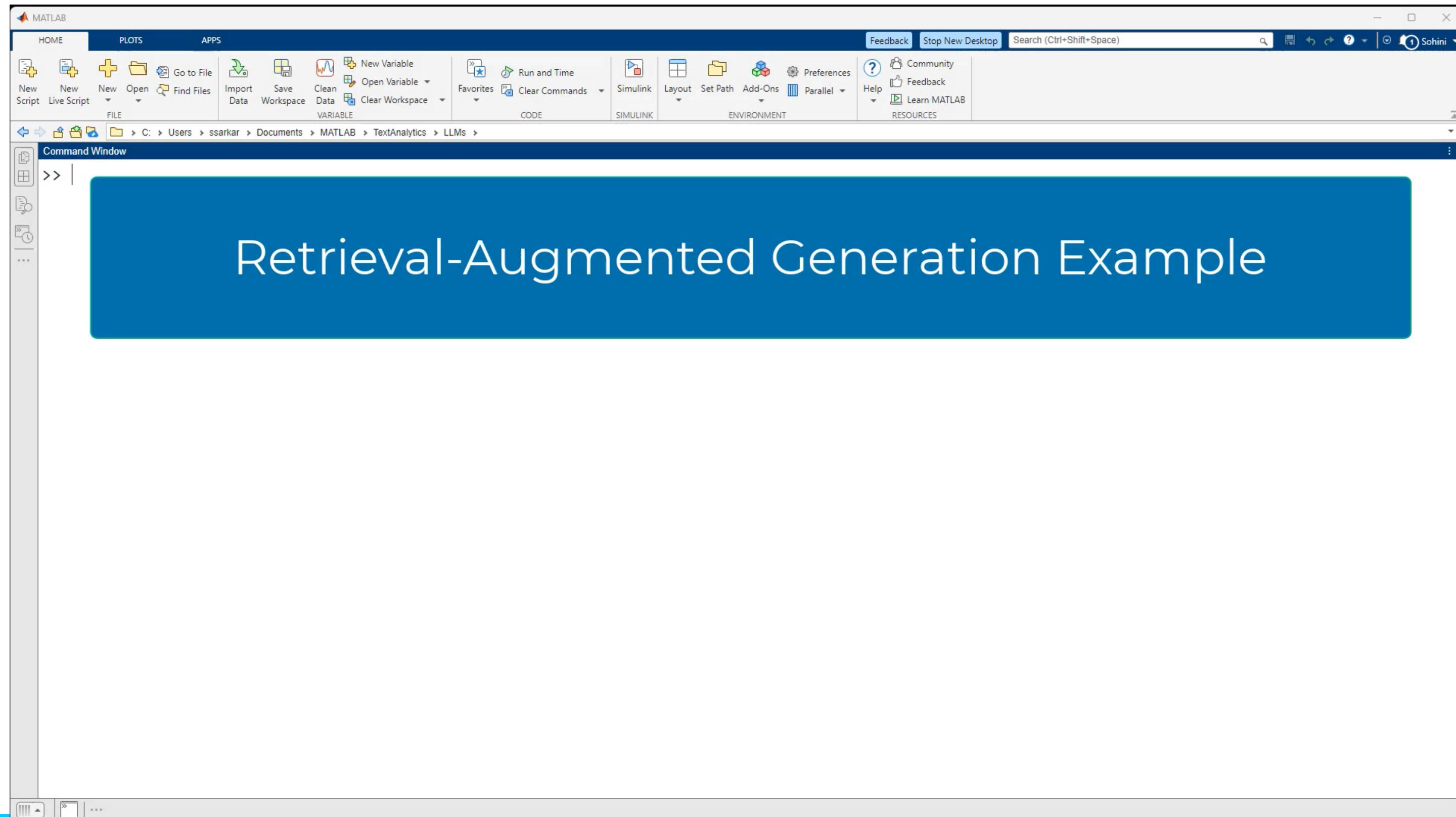
# Prompt Engineering using ChatGPT through OpenAI API



Let's start by adding cloned LLM repo to MATLAB path

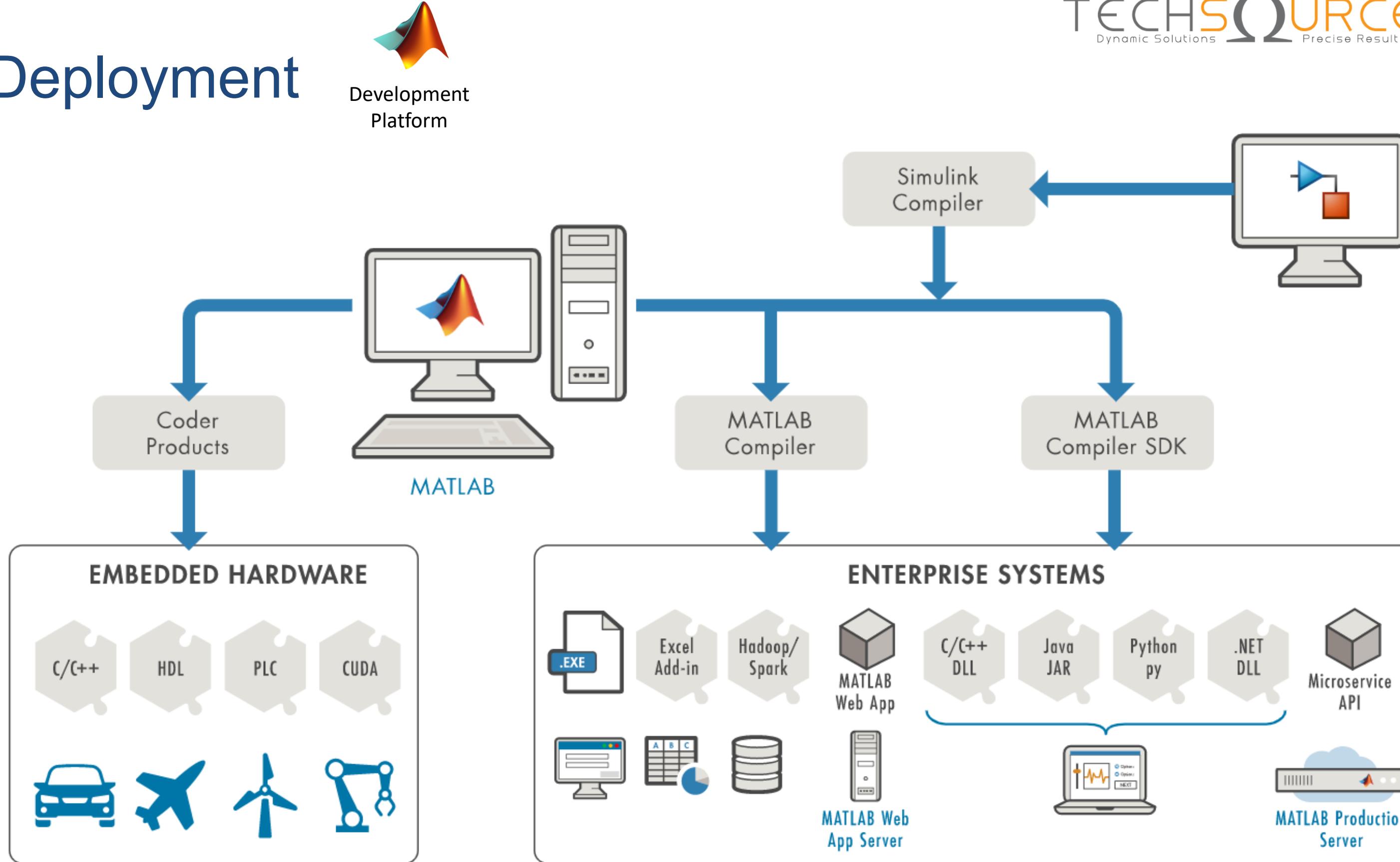
GitHub Repo: [llms-with-matlab](#)

# Retrieval Augmented Generation: Combining LLMs (ChatGPT through OpenAI API) with traditional NLP techniques



GitHub Repo: [llms-with-matlab](#)

# Deployment



# Resources

The screenshot shows the MathWorks website for the Text Analytics Toolbox. The page features a large word cloud visualization at the top. Below it, there's a section titled "Text Analytics Toolbox" with a sub-section "Analyze and model text data". It includes two buttons: "Watch video" and "Download a free trial". A small image of a tablet displaying a sentiment analysis interface is shown below. At the bottom, there's a brief description of the toolbox's capabilities and a note about raw text processing.

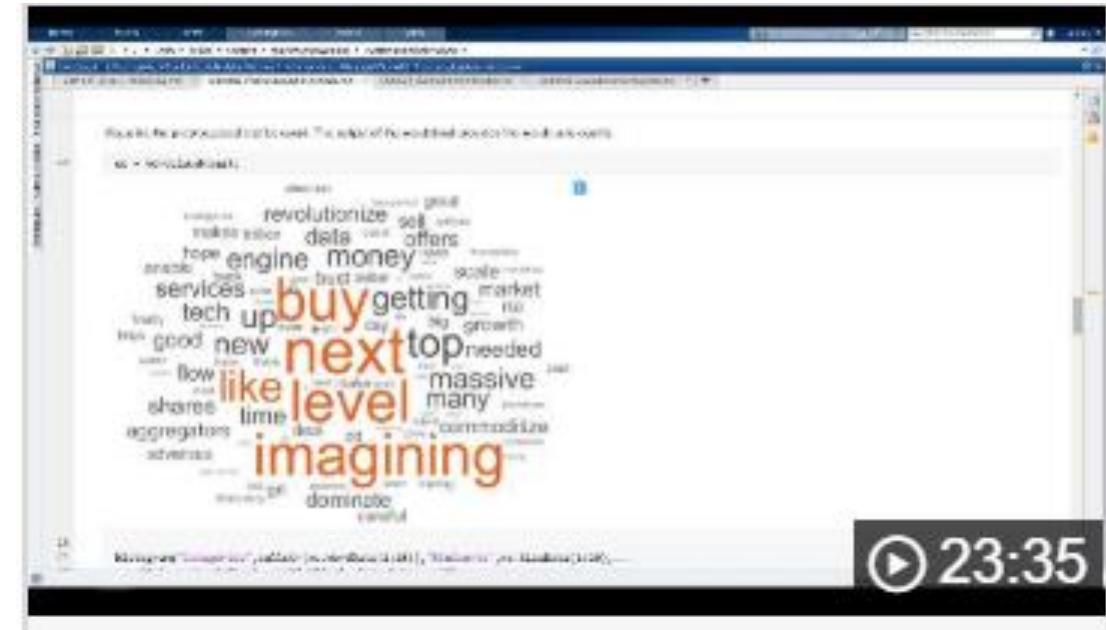
The white paper is divided into four chapters: CHAPTER 1 Text Analytics Applications, CHAPTER 2 Access and Preprocess Text Data, CHAPTER 3 Build Predictive Models, and CHAPTER 4 Share Insights and Use Predictive Models in Applications. Each chapter has a blue header with a right-pointing arrow icon.

## Getting Started with Text Analytics in MATLAB (White Paper)

### Text Analytics Toolbox

This is a screenshot of the official documentation for the Text Analytics Toolbox. It includes a navigation bar with tabs for Documentation, Examples, Functions, Videos, and Answers. The main content area is titled "Text Analytics Toolbox" and describes its purpose: "Analyze and model text data". It provides a detailed description of what the toolbox does, including preprocessing, analyzing, and modeling text data, and lists various applications like sentiment analysis, predictive maintenance, and topic modeling. It also mentions raw text processing from sources like equipment logs, news feeds, surveys, operator reports, and social media. The page ends with a note on machine learning techniques like LSA, LDA, and word embeddings.

### Text Analytics Toolbox – Documentation



### Text Analytics in MATLAB – Video

This is a landing page for getting started with the Text Analytics Toolbox. It features a "Get Started with Text Analytics Toolbox" button. Below it, there are sections for "Release Notes" and "PDF Documentation". To the right, there are two tables: one for "Function Name" and "Description" of various toolbox functions, and another for "Model and Predict" functions. A "Cheat Sheet" icon is also present.

### Cheat Sheet

# Key Takeaway

- ✓ Live Script – Low Code in MATLAB
  - MATLAB online
- ✓ Introduction to NLP and text analytics in MATLAB
  - Leverage the knowledge in your documents using NLP and LLMs in MATLAB
- ✓ Practical example: Classifying text data - NLP
- ✓ Leveraging LLMs for enhanced AI workflows – OpenAI ChatGPT
  - Different ways to leverage the information in documents

# UPCOMING EVENTS....



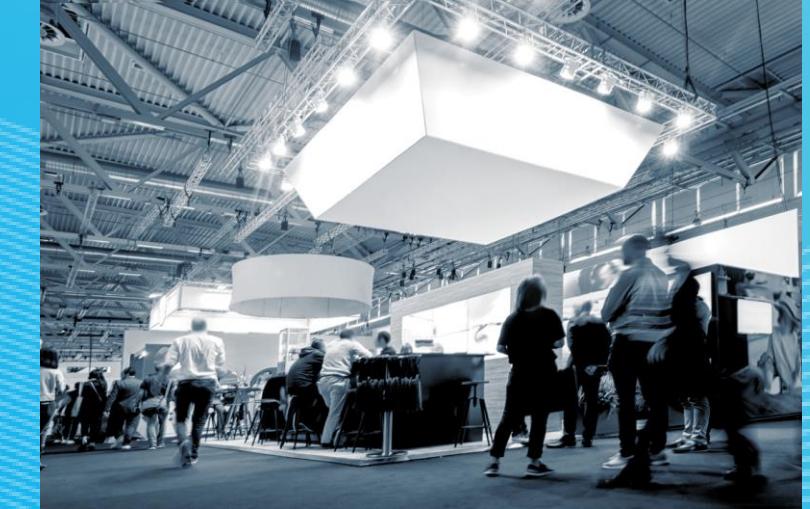
Webinars



Seminars



Hands-on  
Workshops



Tradeshows

[www.techsource-asia.com/events](http://www.techsource-asia.com/events)



techsource-systems



techsourcesystem

TECHSΩURCE

ASCENDAS  
SYSTEMS



TECHSΩURCE

