# MATLAB EXPO 2018

## Introduction to MATLAB

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# Key Takeaways

MATLAB can be used at all stages of your work.

How to automate analysis.

Many resources available to help you to learn basic and advanced MATLAB concepts.

MATLAB
The Language of Technical Computing

# What is MATLAB?

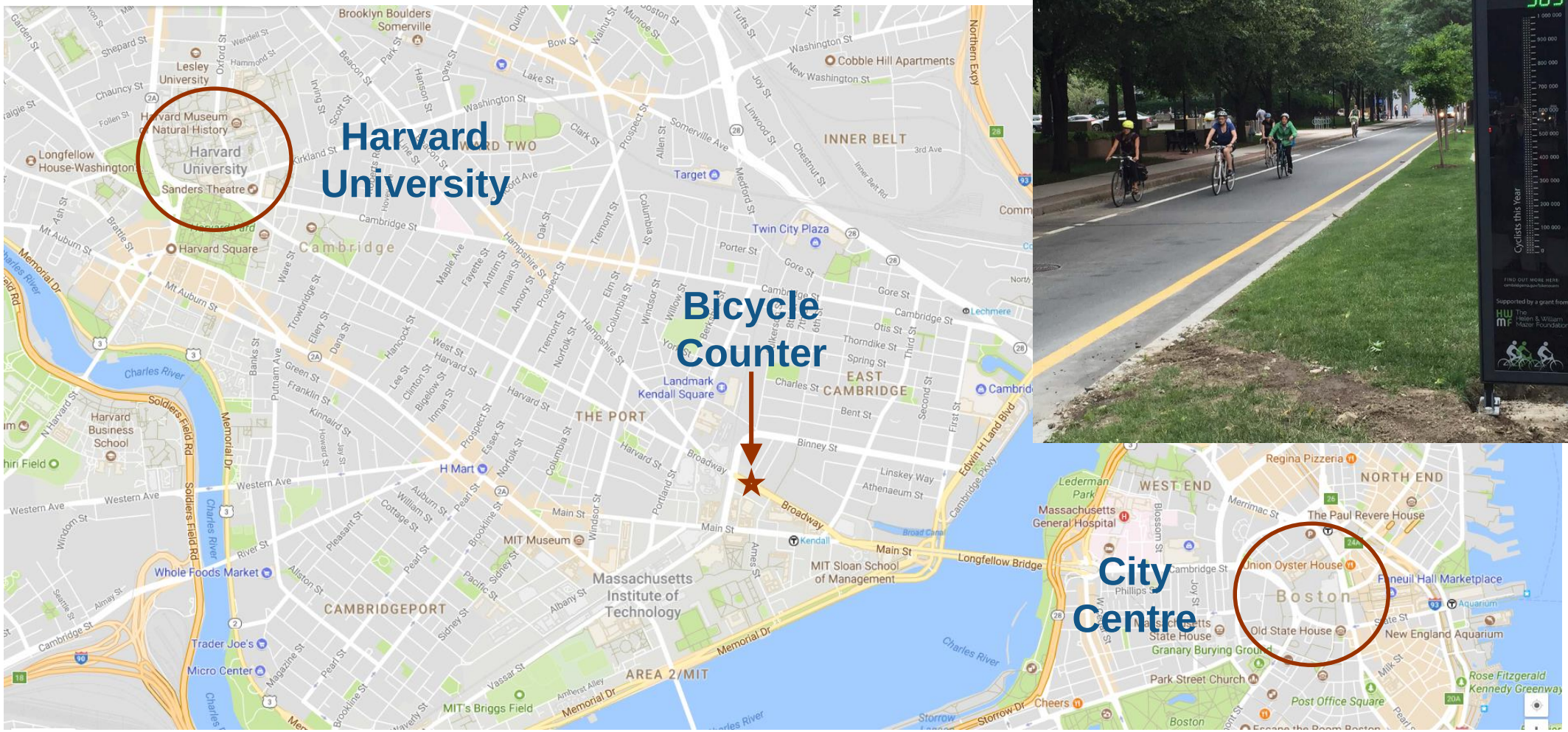
High-level computer language **designed to be used by scientists and engineers** within an easy-to-use interactive environment.

**Extendable** using toolboxes that provide targeted functionality for specific types of analysis or area of expertise.

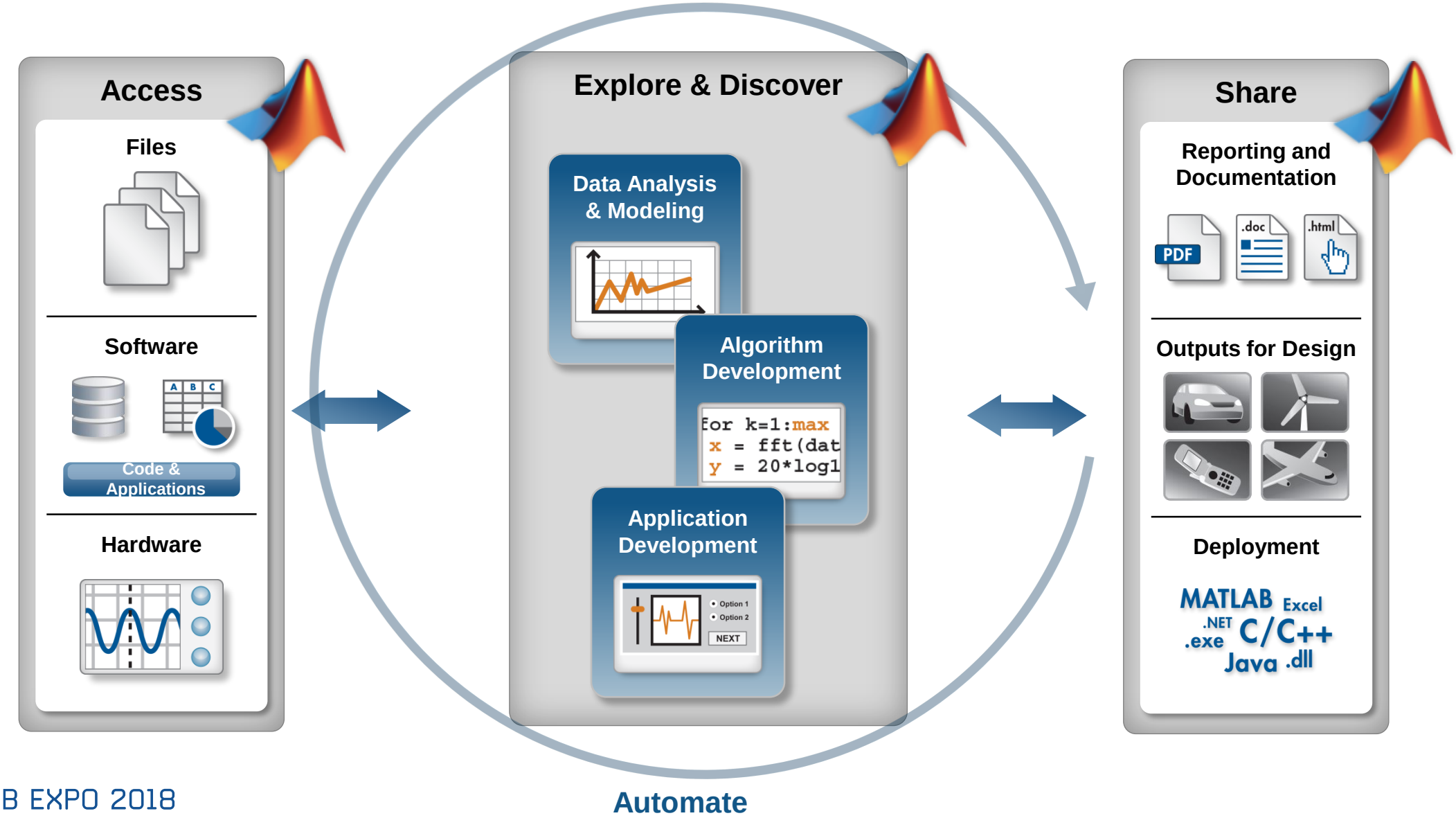
Large range of use cases from simple, **quick analysis** to in-depth programmes for **production** deployment.

MATLAB
The Language of Technical Computing

# Example: Bicycle Traffic Analysis



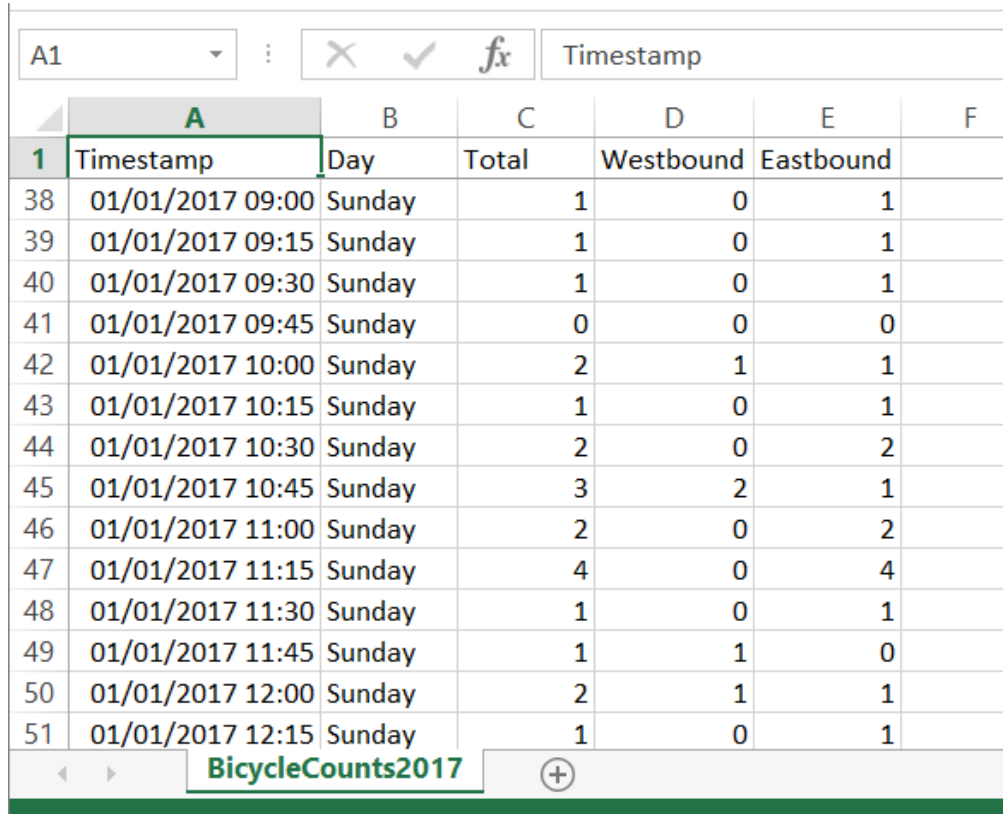
# Technical Computing Workflow



# Example: Bicycle Traffic Analysis

Bicycle count for journeys toward Harvard (**Westbound**) and toward City Centre (**Eastbound**).

Counts recorded every 15 minutes.




| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Timestamp | Day | Total | Westbound | Eastbound | |
| 38 | 01/01/2017 09:00 | Sunday | 1 | 0 | 1 | |
| 39 | 01/01/2017 09:15 | Sunday | 1 | 0 | 1 | |
| 40 | 01/01/2017 09:30 | Sunday | 1 | 0 | 1 | |
| 41 | 01/01/2017 09:45 | Sunday | 0 | 0 | 0 | |
| 42 | 01/01/2017 10:00 | Sunday | 2 | 1 | 1 | |
| 43 | 01/01/2017 10:15 | Sunday | 1 | 0 | 1 | |
| 44 | 01/01/2017 10:30 | Sunday | 2 | 0 | 2 | |
| 45 | 01/01/2017 10:45 | Sunday | 3 | 2 | 1 | |
| 46 | 01/01/2017 11:00 | Sunday | 2 | 0 | 2 | |
| 47 | 01/01/2017 11:15 | Sunday | 4 | 0 | 4 | |
| 48 | 01/01/2017 11:30 | Sunday | 1 | 0 | 1 | |
| 49 | 01/01/2017 11:45 | Sunday | 1 | 1 | 0 | |
| 50 | 01/01/2017 12:00 | Sunday | 2 | 1 | 1 | |
| 51 | 01/01/2017 12:15 | Sunday | 1 | 0 | 1 | |

# Compare with Weather Data

NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Home | Climate Information | Data Access | Customer Support | Contact | About | Search

Home > Climate Data Online > Data Tools > Find a Station | Datasets | Search Tool | Mapping Tool | Data Tools | Help

## Data Tools: Find a Station

Retrieve weather records from observing stations by entering the desired location, data set, data range, and data category. Location can be specified as city, county, state, country, or ZIP code.

Enter Location

Boston, MA, United States

Select Dataset

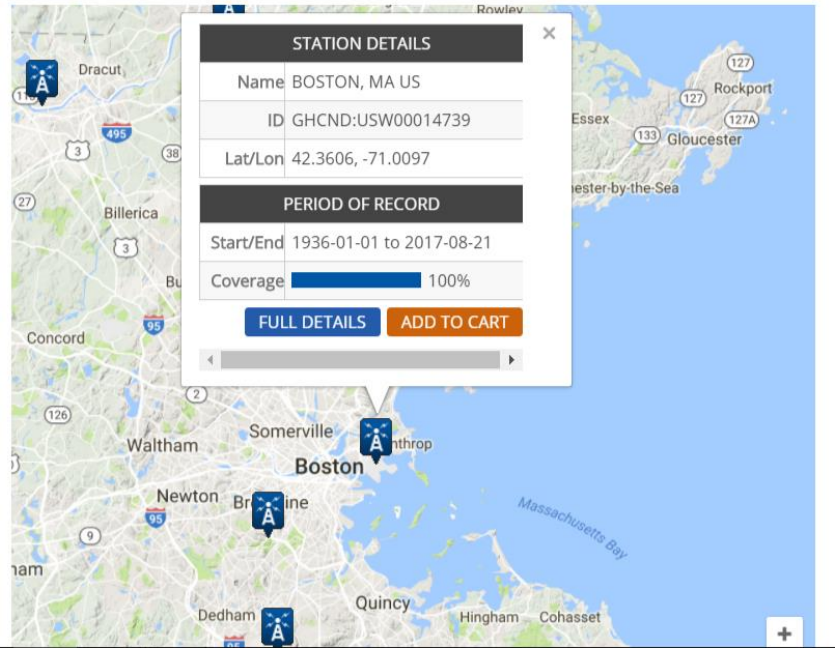
Daily Summaries

Select Date Range

2017-08-21

Data Categories

- Air Temperature
- Evaporation
- Land
- Precipitation

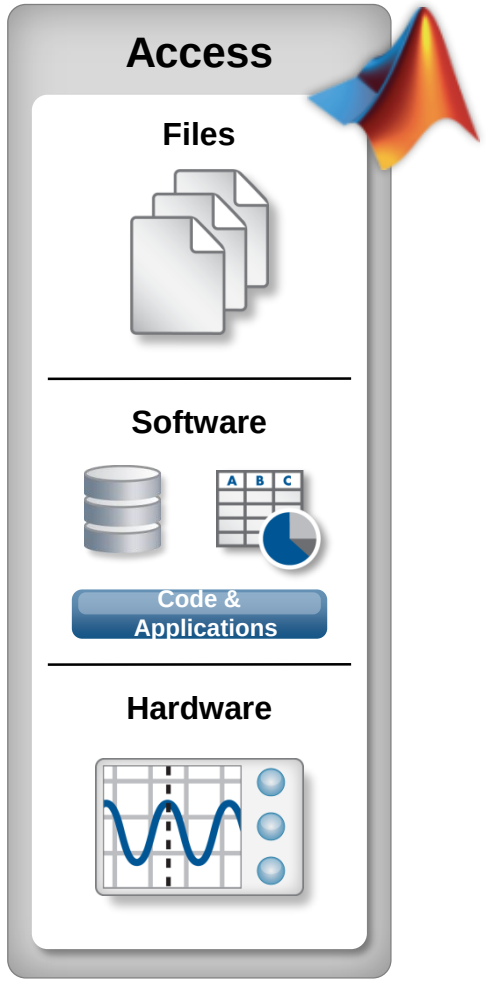



Historical weather data for Boston, MA.

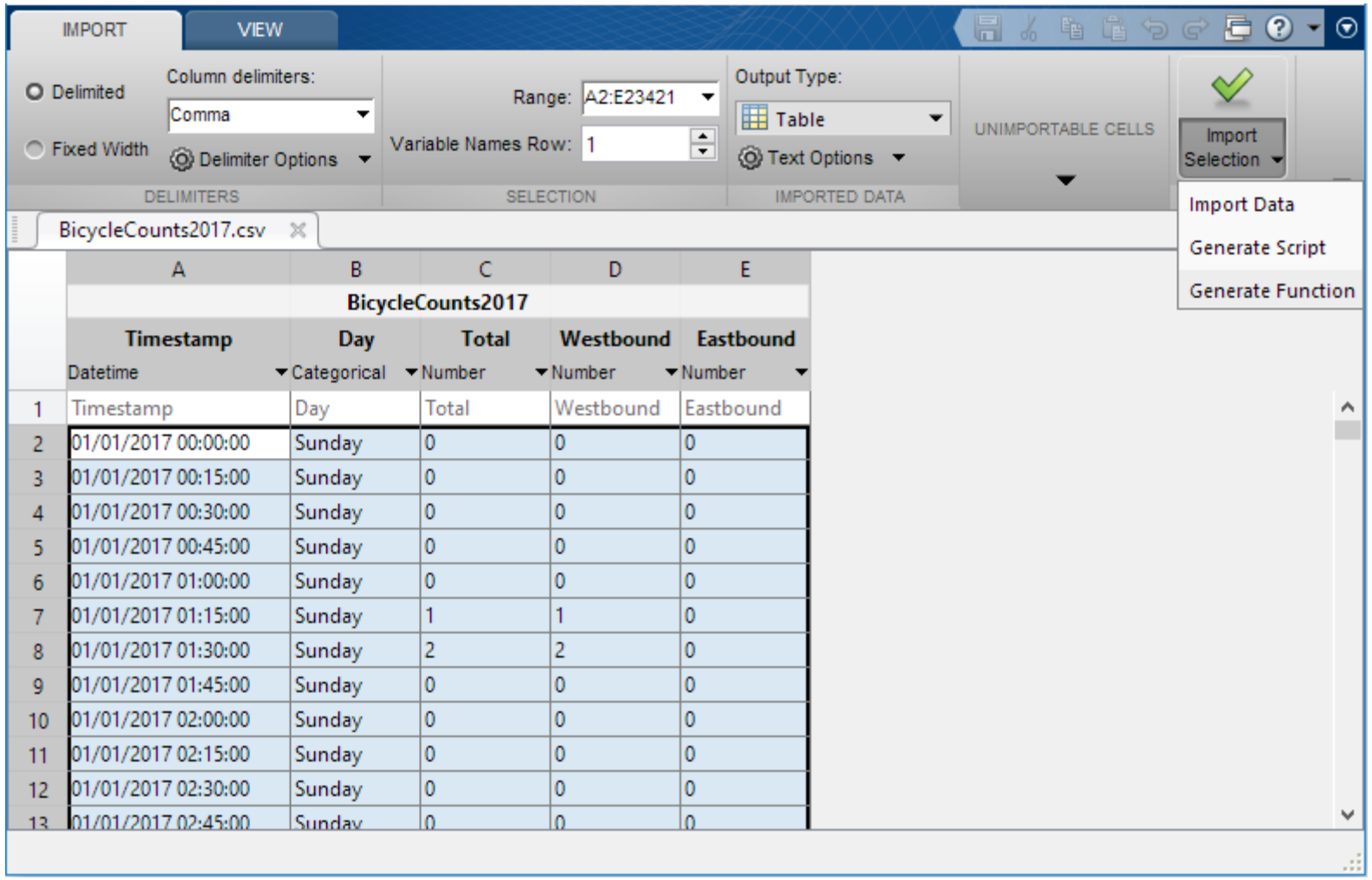
| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | DATE | AvWindSpeed | Precipitation | TAVG | TMAX | TMIN |
| 2 | 01/01/2017 | 14.09 | 0.07 | 40 | 44 | 33 |
| 3 | 02/01/2017 | 4.47 | 0 | 35 | 41 | 28 |
| 4 | 03/01/2017 | 18.12 | 0.89 | 41 | 44 | 40 |
| 5 | 04/01/2017 | 12.53 | 0.06 | 43 | 48 | 33 |
| 6 | 05/01/2017 | 14.76 | 0 | 32 | 34 | 27 |
| 7 | 06/01/2017 | 8.05 | 0.06 | 29 | 31 | 24 |
| 8 | 07/01/2017 | 14.32 | 0.53 | 23 | 24 | 17 |
| 9 | 08/01/2017 | 13.42 | 0.01 | 18 | 22 | 13 |

Same time period as bicycle traffic data.

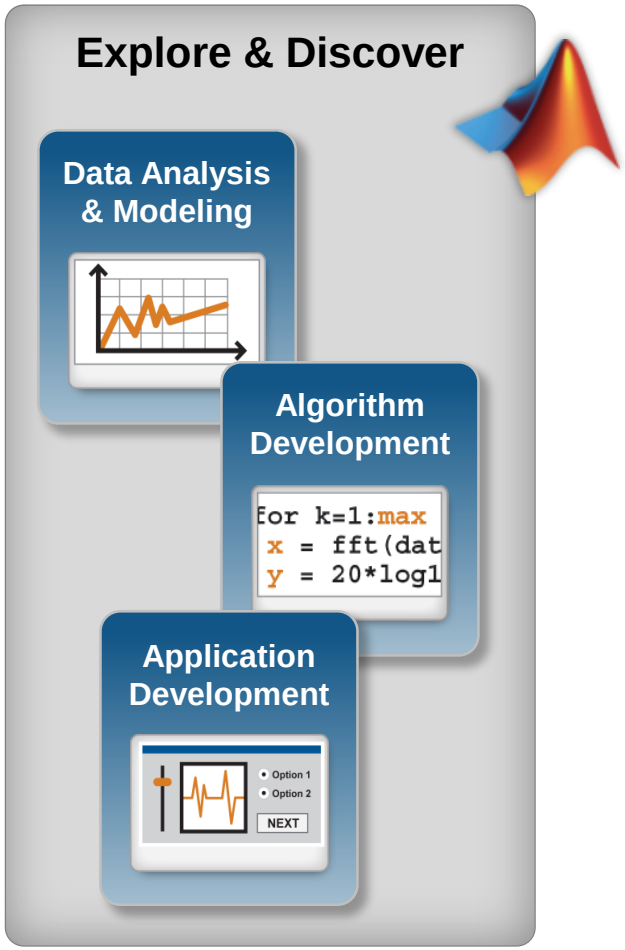
# Importing Data: Interactive or Generate Code



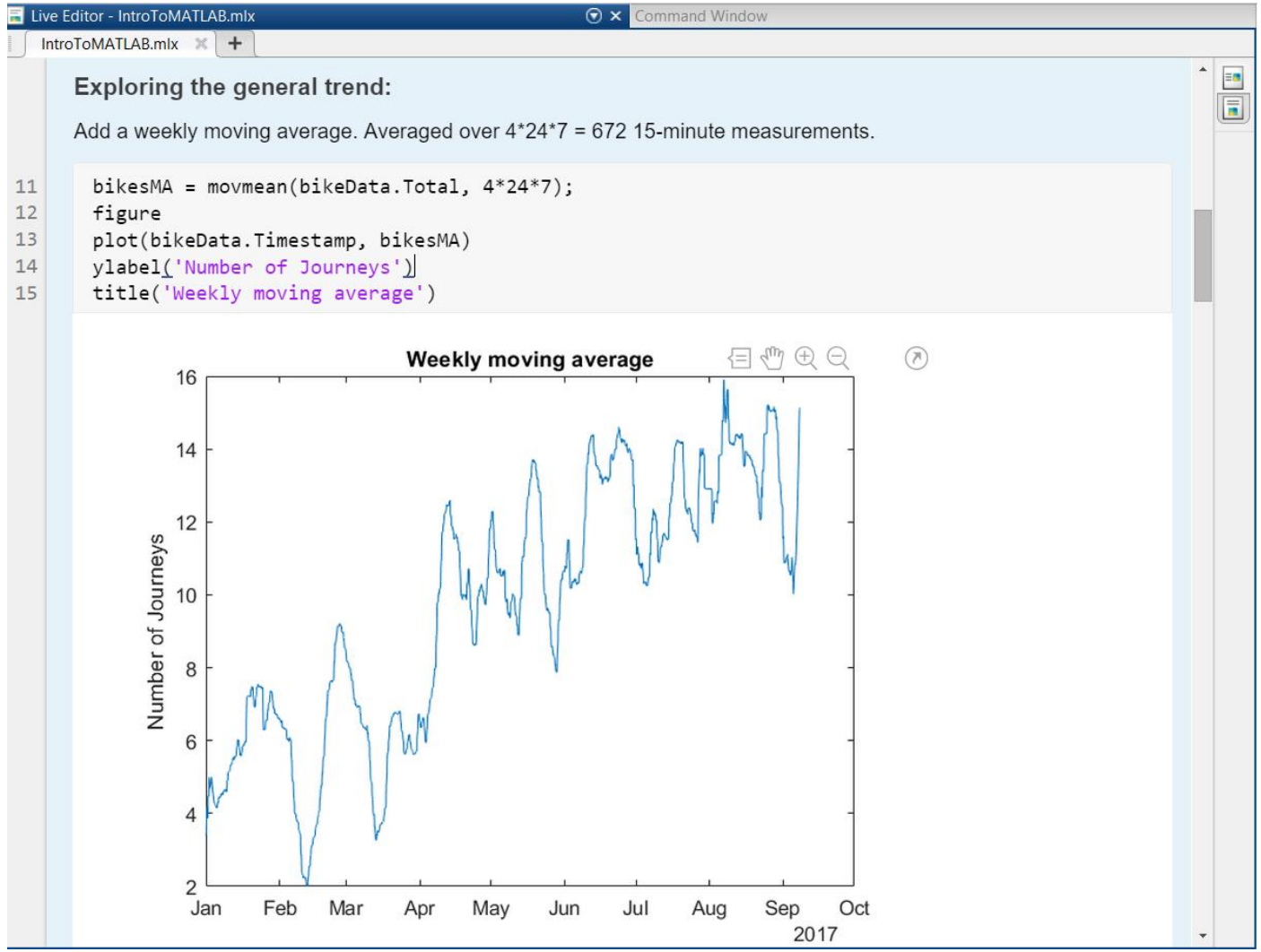

Interactively import data with the Import Tool:



# Are bicycle counts related to the weather?




Live Editor allows for quick and easy exploration of data



# Sharing Code and Applications

## Export as PDF/HTML/LaTeX

**Share**

**Reporting and Documentation**

**Outputs for Design**

**Deployment**

MATLAB Excel .NET .exe C/C++ Java .dll

### Introduction to MATLAB

In this script, we will import in data from `.csv` files interactively, and then generate code to bring in the data programmatically.

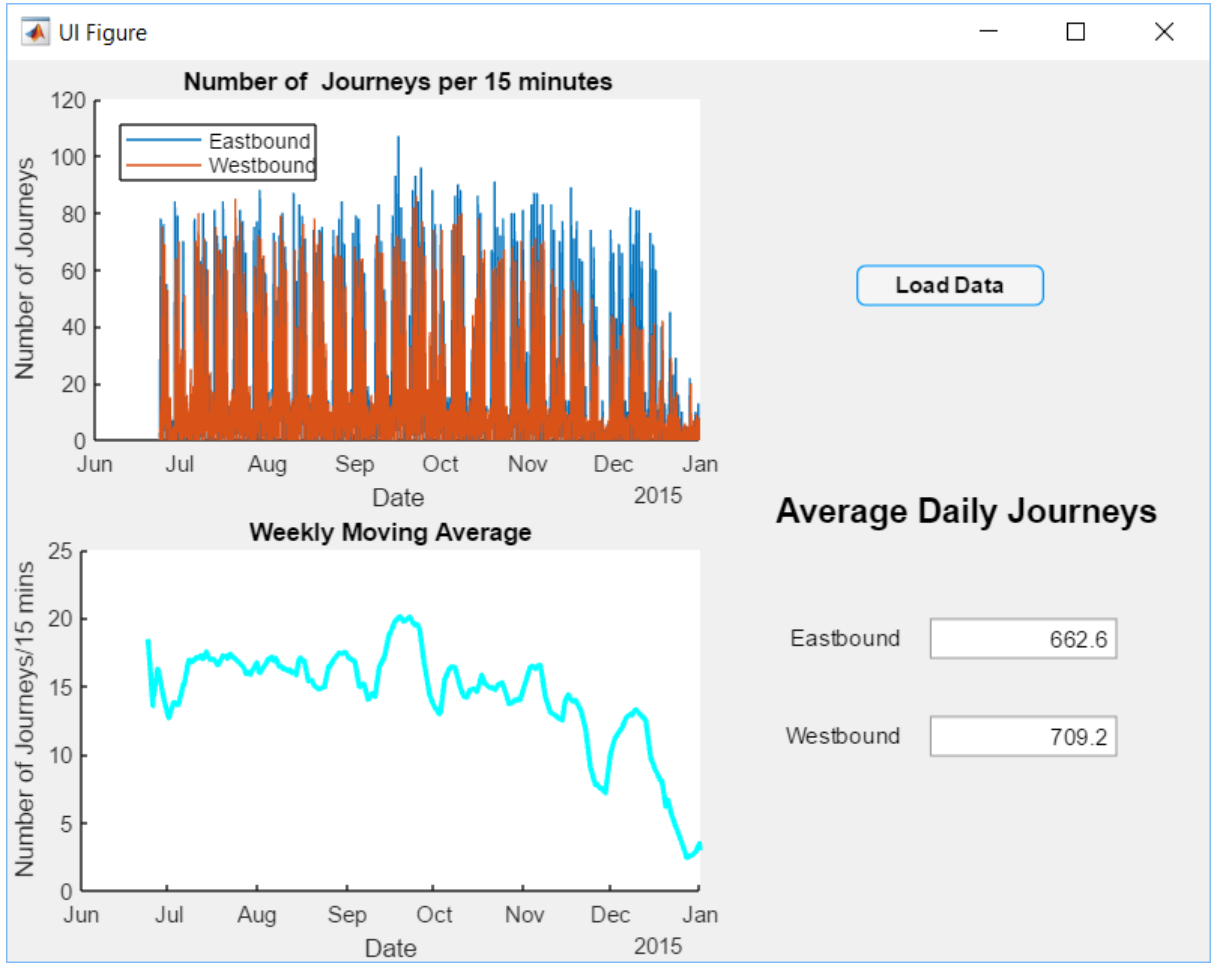
The bicycle counts data comes from sensors on Broadway, Cambridge, Massachusetts, and counts the number of bikes travelling toward *Harvard* (**Westbound**) and toward the *city centre* (**Eastbound**) every 15 minutes.

#### Importing Data

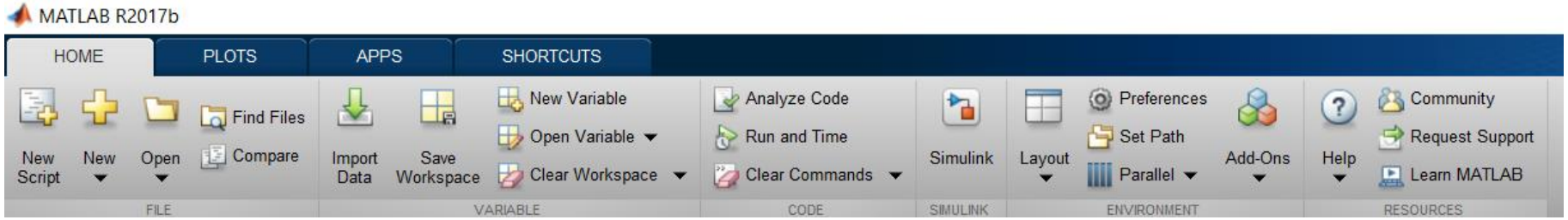
Data can be imported interactively using the Import Tool.

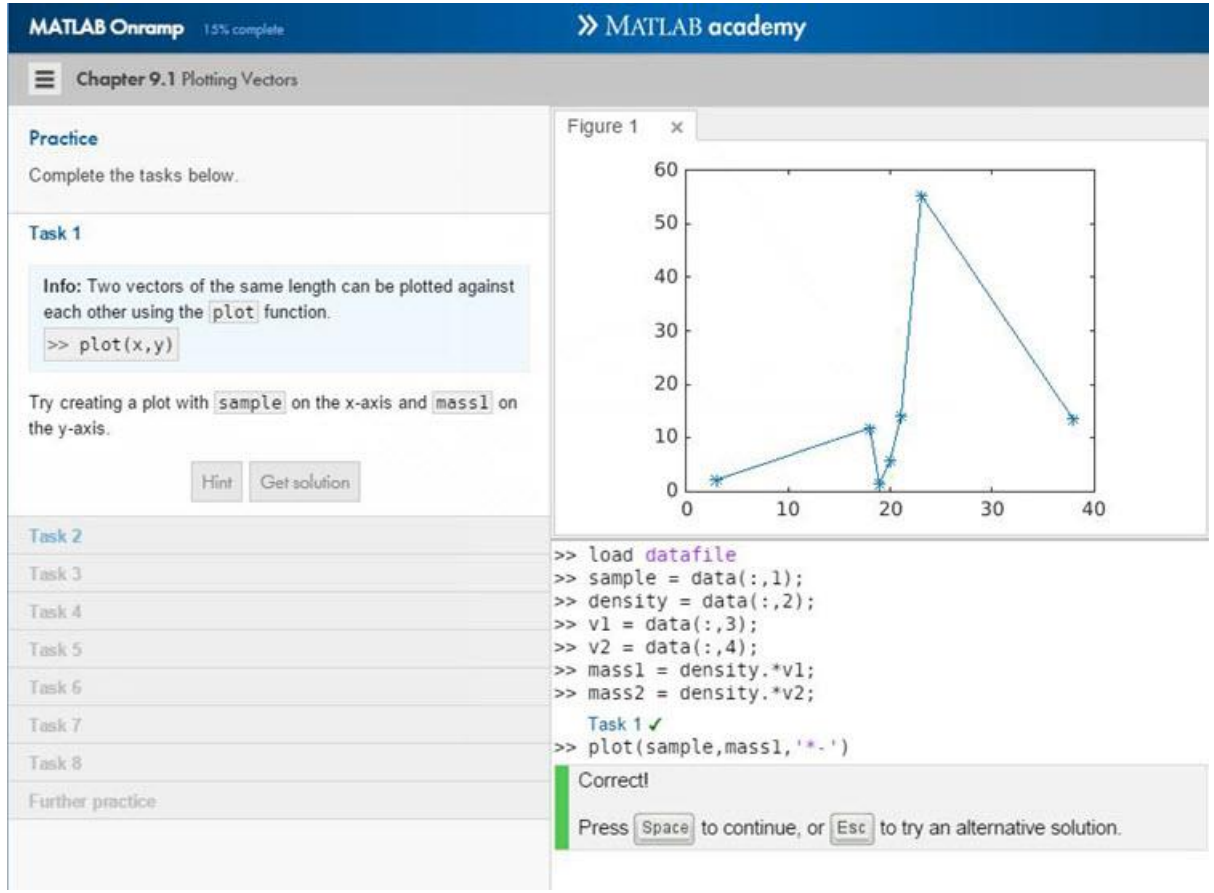
# Sharing Code and Applications

Create stand-alone application for MATLAB and Non-MATLAB users.



# MATLAB Onramp



# MATLAB Training

Classroom Training

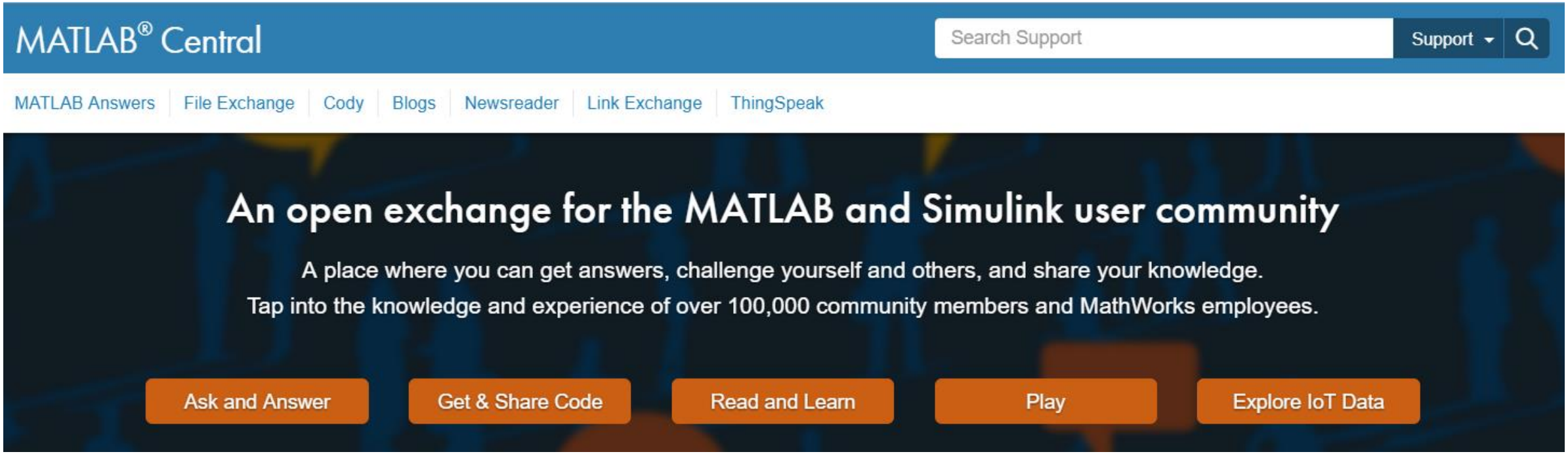
Customized training at your work site

Live Online Courses

Sefl-paced training

Certification

# MATLAB Central



# Summary and Benefits

- Easy and fast to explore ideas.
- Easy deployment and reporting
- Single software for entire workflow.
- Numerous resources for learning and getting help in MATLAB.