

## **Programming Lesson 02: Data in MATLAB**

**The MATLAB files for this section can be found at this link here.**

*The link above contains the live scripts for both coding sections, as well as a PDF of the PowerPoint if you wish to follow along.*

### Objectives

- **Multiple Outputs:** Students will learn how to request multiple outputs from MATLAB functions, such as using the syntax `[xrow, xcol]=size(x)`. As well as learn how to exclude unwanted outputs.
- **Documentation and Help:** Students will understand how to access MATLAB documentation to learn more about MATLAB functions and capabilities.
- **Plotting and Formatting:** Students will be able to create simple plots in MATLAB and research other plot types using documentation. As well as understand how to format their plots effectively.
- **Data Import:** Students will understand how to import data from external files (e.g. .csv, .xlsx, and .txt) into MATLAB.
- **Logical Arrays:** Students will understand how to use relational operators and logical indexing to extract elements of interest from MATLAB arrays.
- **Programming Constructs:** Students will understand when to use if statements and for loops in MATLAB.

### Main Learning Goal

Students will continue to learn the basics of MATLAB and gain useful tools for writing their own programs. Students will also gain hands-on experience in importing data into MATLAB to create plots and learn when to apply common programming constructs.

## Focus Question

How do programmers supply and process data in order to design intelligent computers?

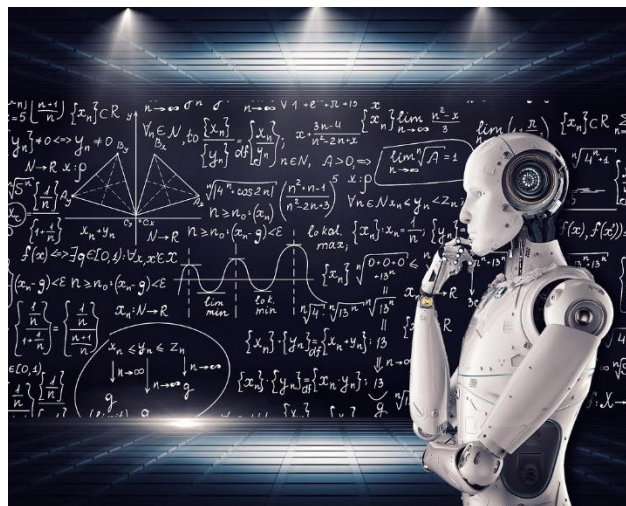


"Exercise Plays Vital Role Maintaining Brain Health." by [A Health Blog](#) is licensed under [CC BY-SA 2.0](#).

## How do Machines Learn?

First, we will watch a short 3-minute video that introduces the concept of **machine learning**, please click on the following link to the MathWorks website:

[Machine Learning Fundamentals | Introduction to Machine Learning, Part 1 - MATLAB & Simulink \(mathworks.com\)](#)



"Artificial Intelligence & AI & Machine Learning" by [mikemacmarketing](#) is licensed under [CC BY 2.0](#).

**Let's discuss the following questions:**

1. What are the common scenarios where machine learning is applied? Have you encountered any of these applications in their daily lives?

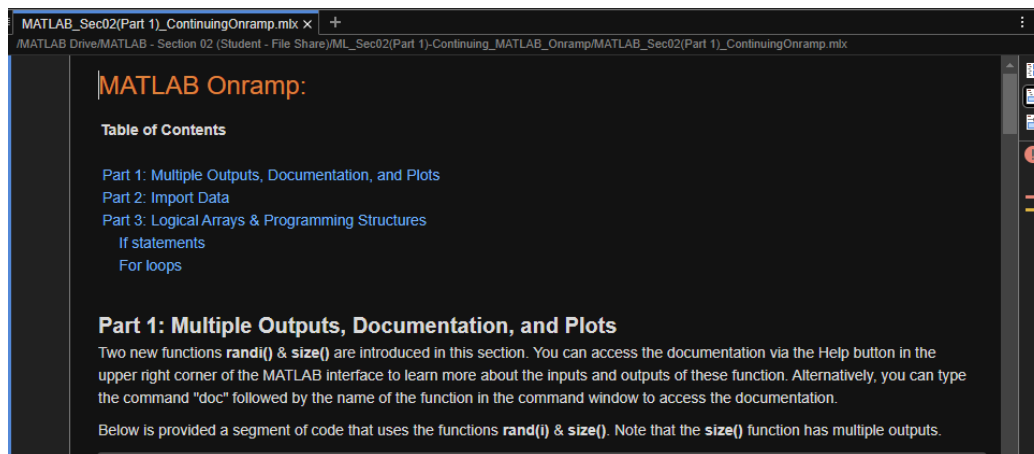
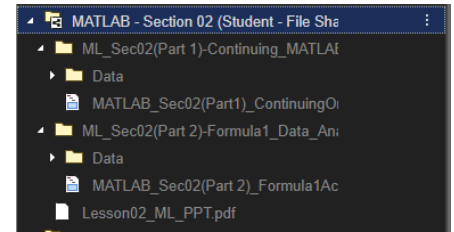
**Examples:** *Netflix and Spotify recommendations systems, social media, image recognition in phones, traffic predictions from Google Maps, etc.*

2. According to the video what are the two main learning techniques employed by machine learning? How are these similar or different to how people learn?

## Continuing With MATLAB Onramp

Please copy over the files for Section 02 from the MATLAB Drive

The files can be found from the link given at the top of the handout: [\[click here\]](#)

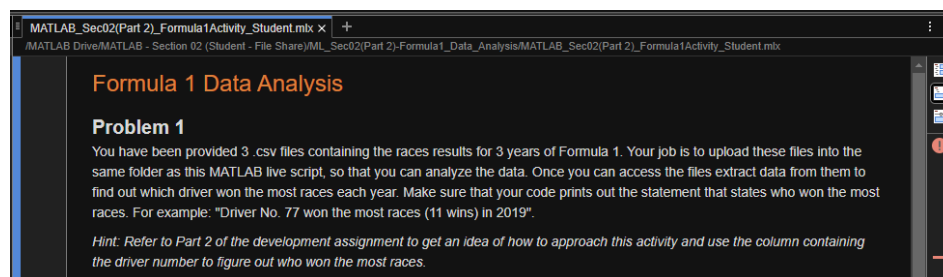


For the first coding activity, please open “**MATLAB\_Sec02(Part1)\_ContinuingOnramp\_v2.mlx**”

Please follow the examples along with the instructor or the PowerPoint PDF that can be found in the same folder as this section’s code in the MATLAB Drive. After completing this live script, please continue to Part 2.

## Formula 1 Data Analysis

The live script for this section can be found in the same MATLAB Drive folder as above: [\[click here\]](#)



For this section you can use the hints given and the PPT to complete the given problems on your own. If you need help, the teacher or teaching assistant will be able to walk through the problem with you.

Make sure to refer back to the previous live script if you are stuck on what code to use to solve a problem!

## How Can Machines Learn About Sports?



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### Let's think about the formula 1 data we just analyzed:

The data import practice problems reveal that the driver that wins a race is not necessarily the fastest driver during the race. For example, Lewis Hamilton (No. 44) who won 11 races in 2019 only got 6 fastest lap awards that same year. Therefore, a program designed to predict who is the next F1 Champion cannot simply rely on who is the fastest.

### Knowing this, discuss and answer the following in groups:

1. What types of data can Formula 1 teams use to make a machine learning model more accurate?
2. Are there variables that cannot be accounted for (e.g. car breakdowns, injuries)?

**Feel free to return to the video on machine learning from the beginning of the section as a refresher!**