Programming Section 01: Getting Started on MATLAB Teacher Page

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Important Links:

- [Teacher Link to MATLAB Drive Link for Section 01](#)
- [Link to Video Tutorial on creating a MathWorks Account](#)
- [Link to Video Tutorial on How to Use MATLAB Drive](#)

Storyline

First, students will participate in an activity that discusses the data and parameters/variables that both sports and music AI tools use when making predictions. Students will think about how this data is gathered, how the data is stored, and what other applications may use data similar to this or similar techniques to make predictions. Students will then be introduced to MATLAB through the MathWorks website, learn how to create an account and use the MATLAB Drive, which will be used to access all the coding files for this camp. Students will then follow along with the teacher when going through the deploy section and learn about the basics of the MATLAB environment as well as basic data types such as doubles, integers, strings, and arrays. They will then complete a small practice activity before going to the deploy assignment where they will complete 2 small problems and then a larger walkthrough problem where they can practice what they learned by completing the "extra" problem at the end. Finally, students will reflect on the elicit activity as well as what they learned in MATLAB to think about what parameters and data types are important when making an AI tool for music or sports (they can choose).

Main Learning Goal

Students will learn the. basics of MATLAB and its interface, such as how to use variables and functions. They will also learn how errors can occur and how to debug them. Finally, students will learn how to create, modify, and utilize arrays in a variety of ways.

Focus Question

How can programmers use MATLAB to create and modify variables and arrays?

Elicit

How will I engage students and elicit their ideas?

Activity Name and Description	Teacher Moves	Student Moves	Resources
Cooking with Variables *30 minutes* **Teacher:** MATLAB Drive Link **Student:** MATLAB Drive Link	- The teacher will introduce the focus of the programming section and tell students about their goal of creating an AI tool to predict the next best athlete or musician by the end of the camp. - The teacher will then introduce the first video on sports. - The teacher will facilitate a discussion of the video using the 3 questions on the handout (and PPT) - The teacher will then introduce the video on music. - The teacher will facilitate a discussion around comparing the use of Data	- Students will listen to the introduction of the programming section's overall goal and project. - The student will watch the first video and participate in the discussion of the 3 provided questions. - Students will consider what is important when making predictions and how more data means predictions will be more accurate. - Students will think about how data such as numbers vs. words (strings) will be stored and treated differently by a program. - Students will think about other applications	- Coding Analogy Examples - MATLAB Fundamentals - Video On Sports Analytics - Video on Data Science in Music **Teacher:** MATLAB Drive Link **Student:** MATLAB Drive Link

Activity Name and Description	Teacher Moves	Student Moves	Resources
	Science in sports vs. music and how gathering/ manipulating the data is different or the same. • Lastly, the teacher will assist students using the 2 provided videos on how to create a MATLAB account and how to use the MATLAB Drive to copy over files for them to edit.	that can use predictive AI tools and why they might be useful. • Students will watch the second video on Data Science in the music industry. • Students will participate in a discussion of how this predictive tool is different or similar than the Sports application, and what data is important. • Lastly, students will follow along with the teacher and create their MATLAB accounts and copy over the Section 01 files from the MATLAB Drive.	

Develop

How will I get students to explore, explain, and develop ideas?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **Getting Started!** • *20 minutes* • Teacher introduces the basics of MATLAB and provides explicit coding examples to guide the students thinking. • Students listen to the teacher and follow along in MATLAB by running the coding cells. • MATLAB Drive Link	• Teacher opens the live script and asks students to also open it to run the coding cells. • Teacher explains the three main windows to the students. • Teacher explains the command window and how to use it. • Teacher explains live scripts and how to use it. • Teacher explains the topic on variables. • Teacher runs the variables and instructs the students to do the same.	• Students download the script, open MATLAB, and open the script. • Students listen and observe the three main windows in MATLAB. • Students listen and observe the command window. • Students listen and observe the live script tool. • Students listen to the teacher instruct on variables. • Students run the coding cells. • Students listen and observe their workspace.	• MATLAB Fundamentals • Getting Started with MATLAB • Matrices and Arrays in MATLAB • Calling Functions in MATLAB

Activity Name and Description	Teacher Moves	Student Moves	Resources
	• Teacher makes a note about the. variable names in the workspace.	• Students listen to the teacher explain variable names.	
	• Teacher explains how good vs bad variable names relate to baking.	• Students listen to teacher and then create their own constant.	
	• Teacher explains what constants are in MATLAB and instructs students to create a constant.	• Students listen to teacher and runs the coding cells.	
	• Teacher explains built-in MATLAB functions and provides coding examples to run.	• Students complete the built-in function task in the coding cell.	
	• Teacher gives students a task on built-in functions.	• Students listen to teacher discuss arrays.	
	• Teacher explains arrays and how to create them.	• Students run the coding cells and observe the outputs.	

Activity Name and Description	Teacher Moves	Student Moves	Resources
	• Teacher explains the coding cells and runs them. • The teacher will helps students with the Steph Curry Example	• Students will follow along with the teacher and complete the Steph Curry example.	

Deploy
How will I get students to use and apply their ideas to what they've learned?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **Data in Music** • *25 minutes* • **Teacher:** MATLAB Drive Link • **Student:** MATLAB Drive Link • This activity will have students working for a record label and organizing data such as song titles and the number of listens for each song. They will then follow a guided problem to learn more	• Teacher opens the Data in Music live script and instructs students to do the same • The teacher will help students with the first 2 problems, but these will mostly be practice of what they learned in the develop section, and should try to be completed on their own. • After problem 1 and 2, the teacher will walk through problem 3 with the students as this will introduce them to how to use some concepts that are	• Students open the part 2 "Data in Music" live script and follow along with the teacher • Students will complete Problem 1 and 2 with help from the teacher when they are stuck. These problems will have students create lists and use the mean() function they were introduced to in the	• MATLAB Fundamentals • Getting Started with MATLAB • Matrices and Arrays in MATLAB • Calling Functions in MATLAB

Activity Name and Description	Teacher Moves	Student Moves	Resources
about how to index arrays and use min and max functions. • **NOTE:** Please make sure that the variable names are consistent between problems since Problem 3 assumes the names of the variables are the ones used in the comments (hints)	more complicated and they have less practice with, such as 2d arrays that were briefly introduced in the deploy, as well as the minimum, maximum, and find functions. • After the teacher walks through Problem 3 and answers any questions the students have, they should allow students the time to try the extra part of problem 3 which is the same but asks for the minimum instead of the maximum.	develop section. • Students will follow along with the explanation and walkthrough of problem 3 and ask any questions when they are confused or stuck. • Students will try the extra part of problem 3 if time allows and the teacher will help with any misconceptions.	

Refine

How will I get students to extend, elaborate, and change their ideas based on what we now understand?

Activity Name and Description	Teacher Moves	Student Moves	Resources
• **Choosing Parameters that Matter** • *10 minutes* • In this activity, students will be choosing	• Teacher will have students split up into groups or partners depending on whether they are interested	• Students will follow the teacher's instructions and split into groups or with partners depending on	• Coding Analogy Examples • MATLAB Fundamentals

Activity Name and Description	Teacher Moves	Student Moves	Resources
whether they want to create an AI tool that predicts the next best athlete or the next best musician/top track. They will then think of at least 5 parameters they believe determines this, give reasonings why, and then share/discuss with the class.	in choosing music or sports as a theme for their AI prediction tool. • The teacher will give students 5-7 minutes to come up with 5 parameters (with reasons) that are important for their AI tool to consider when making a prediction. • The teacher will facilitate a discussion about these parameters for both the music and sports AI tools.	their interest in sports or music. • Students will follow the activity instructions and brainstorm 5 parameters that are important for their tool when making predictions along with providing reasoning. • Students will participate in a discussion of these parameter with the class.	