**DAILY ASSESSMENT**

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| **Date:** | **06/07/2020** | **Name:** | **Gaganashree P** |
| **Course:** | **Matlab from mathworld** | **USN:** | **4AL15EC 024** |
| **Topic:** | **Course overview, commands, MATLAB Desktop and Editor, vectors and matrices** | **Semester & Section:** | **8th - A** |
| **GitHub Repository:** | **Gaganashree-P** |  |  |

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| **FORENOON SESSION DETAILS** |
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**REPORT –**

It is abbreviated as Matrix-based language, has been designed for computer scientists and engineers. Matlab provides great solutions in computational mathematics.

It can be used for –

1. Data analysis
2. Algorithm development
3. Create models and application

Matlab finds a great use case in machine learning and deep learning as they deal with n-dimensional space which can be represented and analyzed in the matrix form only. Apart from this other technologies using this are control system design, image processing, and computational finance.

### Matlab Commands

Matlab provides the commands that are used while the user has to interact with the application using the command line interface. Here we will see how to use those commands with the help of examples

### Basic Commands

**1. Clear** – This command removes variables from the memory

**2. Exist** – This command checks for the existence of a variable

**3. Clc** – This command clears the command window

**4. Global** – This command declares a variable as global

**5. Help** – If you need to search for any help just write the keyword at command window and it displays your available options

**6. Who** – This command lists the current variable

**7. Type** – This command displays the contents of a file.

**8. Pwd** – This command displays the current directory.

**9. Date** – This command displays the current date

**10. What** – This command lists all the Matlab files in the current directory

### Array Operations

Array operations execute element by element operations on corresponding elements of vectors, matrices, and multidimensional arrays. If the operands have the same size, then each element in the first operand gets matched up with the element in the same location in the second operand. If the operands have compatible sizes, then each input is implicitly expanded as needed to match the size of the other.

As a simple example, you can add two vectors with the same size.

A = [1 1 1]

A =

1 1 1

B = [1 2 3]

B =

1 2 3

A+B

ans =

2 3 4

If one operand is a scalar and the other is not, then MATLAB implicitly expands the scalar to be the same size as the other operand. For example, you can compute the element-wise product of a scalar and a matrix.

A = [1 2 3; 1 2 3]

A =

1 2 3

1 2 3

3.\*A

ans =

3 6 9

3 6 9

Implicit expansion also works if you subtract a 1-by-3 vector from a 3-by-3 matrix because the two sizes are compatible. When you perform the subtraction, the vector is implicitly expanded to become a 3-by-3 matrix.

A = [1 1 1; 2 2 2; 3 3 3]

A =

1 1 1

2 2 2

3 3 3

m = [2 4 6]

m =

2 4 6

A - m

ans =

-1 -3 -5

0 -2 -4

1 -1 -3

A row vector and a column vector have compatible sizes. If you add a 1-by-3 vector to a 2-by-1 vector, then each vector implicitly expands into a 2-by-3 matrix before MATLAB executes the element-wise addition.

x = [1 2 3]

x =

1 2 3

y = [10; 15]

y =

10

15

x + y

ans =

11 12 13

16 17 18

If the sizes of the two operands are incompatible, then you get an error.

A = [8 1 6; 3 5 7; 4 9 2]

A =

8 1 6

3 5 7

4 9 2

m = [2 4]

m =

2 4

A - m

Matrix dimensions must agree.

The following table provides a summary of arithmetic array operators in MATLAB. For function-specific information, click the link to the function reference page in the last column.

| **Operator** | **Purpose** | **Description** | **Reference Page** |
| --- | --- | --- | --- |
| + | Addition | A+B adds A and B. | [plus](https://in.mathworks.com/help/matlab/ref/plus.html) |
| + | Unary plus | +A returns A. | [uplus](https://in.mathworks.com/help/matlab/ref/uplus.html) |
| - | Subtraction | A-B subtracts B from A | [minus](https://in.mathworks.com/help/matlab/ref/minus.html) |
| - | Unary minus | -A negates the elements of A. | [uminus](https://in.mathworks.com/help/matlab/ref/uminus.html) |
| .\* | Element-wise multiplication | A.\*B is the element-by-element product of A and B. | [times](https://in.mathworks.com/help/matlab/ref/times.html) |
| .^ | Element-wise power | A.^B is the matrix with elements A(i,j) to the B(i,j) power. | [power](https://in.mathworks.com/help/matlab/ref/power.html) |
| ./ | Right array division | A./B is the matrix with elements A(i,j)/B(i,j). | [rdivide](https://in.mathworks.com/help/matlab/ref/rdivide.html) |
| .\ | Left array division | A.\B is the matrix with elements B(i,j)/A(i,j). | [ldivide](https://in.mathworks.com/help/matlab/ref/ldivide.html) |
| .' | Array transpose | A.' is the array transpose of A. For complex matrices, this does not involve conjugation. | [transpose](https://in.mathworks.com/help/matlab/ref/transpose.html) |

### Matrix Operations

Matrix operations follow the rules of linear algebra and are not compatible with multidimensional arrays. The required size and shape of the inputs in relation to one another depends on the operation. For nonscalar inputs, the matrix operators generally calculate different answers than their array operator counterparts.

For example, if you use the matrix right division operator, /, to divide two matrices, the matrices must have the same number of columns. But if you use the matrix multiplication operator, \*, to multiply two matrices, then the matrices must have a common inner dimension. That is, the number of columns in the first input must be equal to the number of rows in the second input. The matrix multiplication operator calculates the product of two matrices with the formula,

*C*(*i*,*j*)=*n*Ξ*k*=1*A*(*i*,*k*)*B*(*k*,*j*).

To see this, you can calculate the product of two matrices.

A = [1 3;2 4]

A =

1 3

2 4

B = [3 0;1 5]

B =

3 0

1 5

A\*B

ans =

6 15

10 20

The previous matrix product is not equal to the following element-wise product.

A.\*B

ans =

3 0

2 20

**DAILY ASSESSMENT**

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| **Date:** | **6/07/2020** | **Name:** | **Gaganashree P** |
| **Course:** | **IOT** | **USN:** | **4AL15EC023** |
| **Topic:** | **Chapter 1 and 2** | **Semester & Section:** | **8TH SEM &A Section** |
| **Github Repository:** | **Gaganashree-P** |  |  |

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| **AFTERNOON SESSION DETAILS**   ****Introduction to IoT**** The ‘Thing’ in IoT can be any device with any kind of built-in-sensors with the ability to collect and transfer data over a network without manual intervention. The embedded technology in the object helps them to interact with internal states and the external environment, which in turn helps in decisions making process.  IoT Giant Network - IoT Tutorial - Edureka  IOT Tutorial: What is IoT?  In a nutshell, IoT is a concept that connects all the devices to the internet and let them communicate with each other over the internet. IoT is a giant network of connected devices – all of which gather and share data about how they are used and the environments in which they are operated.  By doing so, each of your devices will be learning from the experience of other devices, as humans do. IoT is trying to expand the interdependence in human- i.e interact, contribute and collaborate to things. I know this sounds a bit complicated, let’s understand this with an example.  A developer submits the application with a document containing the standards, logic, errors & exceptions handled by him to the tester. Again, if there are any issues Tester communicates it back to the Developer. It takes multiple iterations & in this manner a smart application is created.  Similarly, a room temperature sensor gathers the data and send it across the network, which is then used by multiple device sensors to adjust their temperatures accordingly.  For example, refrigerator’s sensor can gather the data regarding the outside temperature and accordingly adjust the refrigerator’s temperature. Similarly, your air conditioners can also adjust its temperature accordingly. This is how devices can interact, contribute & collaborate.  IoT Example - IoT Tutorial - Edureka  IOT Tutorial: Connecting multiple devices  I hope that now you would have got an idea of what IoT really is. Now advancing in our IoT tutorial, we will discuss the benefits of IoT and the hardware used in IoT application. ****IoT Tutorial: Benefits of IoT**** Since IoT allows devices to be controlled remotely across the internet, thus it created opportunities to directly connect & integrate the physical world to the computer-based systems using sensors and internet. The interconnection of these multiple embedded devices will be resulting in automation in nearly all fields and also enabling advanced applications. This is resulting in improved accuracy, efficiency and economic benefit with reduced human intervention. It encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. The major benefits of IoT are:   * **Improved Customer Engagement** – IoT improves customer experience by automating the action. For e.g. any issue in the car will be automatically detected by the sensors. The driver, as well as the manufacturer, will be notified about it. Till the time driver reaches the service station, the manufacturer will make sure that the faulty part is available at the service station. * **Technical Optimization**– IoT has helped a lot in improving technologies and making them better. The manufacturer can collect data from different car sensors and analyze them to improve their design and make them much more efficient. * **Reduced Waste** – Our current insights are superficial, but IoT provides real-time information leading to effective decision making & management of resources. For example, if a manufacturer finds fault in multiple engines, he can track the manufacturing plant of those engines and can rectify the issue with manufacturing belt.   [[Course Curriculum](https://www.edureka.co/iot-certification-training)](https://www.edureka.co/iot-certification-training" \t "_blank) [IoT Certification Training on Azure](https://www.edureka.co/iot-certification-training" \t "_blank)  * *[Instructor-led Sessions](https://www.edureka.co/iot-certification-training" \t "_blank)* * *[Real-life Case Studies](https://www.edureka.co/iot-certification-training" \t "_blank)* * *[Assignments](https://www.edureka.co/iot-certification-training" \t "_blank)* * *[Lifetime Access](https://www.edureka.co/iot-certification-training" \t "_blank)*   [Explore Curriculum](https://www.edureka.co/iot-certification-training" \t "_blank)  Nowadays, we are surrounded by lots of IoT enabled devices which are continuously emitting data and communicating through multiple devices. Moving ahead, let’s discuss the required hardware for building an IoT application. We will also look at the IoT devices which we are using in our day to day life. ****IoT Tutorial: IoT Hardware**** Now you would be wondering what is the required hardware for preparing an IoT solution. The answer to this question is, you’ll first require sensors that will sense the environment, then you require a remote dashboard to monitor your output and display it in a clearer & conceivable form. At last, you will require a device with the capability of serving & routing. The key task of the system would be detecting specific conditions and taking actions accordingly. One thing to keep in mind is securing the communication between the devices and the dashboard.  Some of the common sensors that you are surrounded by are accelerometers, temperature sensors, magnetometers, proximity sensors, gyroscopes, image sensors, acoustic sensors, light sensors, pressure sensors, gas RFID sensors, humidity sensors & micro flow sensors.  Nowadays we also have many wearable devices like smartwatches, shoes & 3D glasses. This is the best example of a smart solution. 3D glasses adjust television’s brightness and contrast according to your eye and your smartwatches keeps track of your daily activities and fitness.  But I feel the most important device which has tremendously contributed to IoT are the cell phones. Mobile apps have immensely contributed to revolutionizing the technology world. Cell phones are already encased with applications and sensors that reveals lots of information about its user. It has Geo-location information, it can sense and trace light condition, the orientation of your device and a lot more information. It also comes with multiple connectivity options like Wi-Fi, Bluetooth and cellular that helps them to communicate with other devices. Thus, due to these default qualities of cell phones, it is the core of the IoT ecosystem. Today, Smartphone can interact with smartwatch and fitness band to further ease and enhance the user experience.  IoT uses multiple technologies and protocols to communicate with devices based on the requirements. The major technologies & protocols are Bluetooth, wireless, NFC, RFID, radio protocols and WiFi-Direct.  IoT applications are flourishing across all industries & market. The IoT has a multitude of expansion over various industries. It spans over all groups of users, from those who are trying to reduce & conserve energy in their home to large organizations who want to improve their business operations. IoT has not only proved itself useful in optimizing critical applications in many organisations, but also have boosted the concept of advanced automation which we have imagined a decade before. Let’s understand the capabilities of IoT across different industries and look how they are revolutionizing them. ****IoT Tutorial: IoT Across Various Domains**** **Energy Applications:**The energy rates have raised to a great instinct. Individuals and organisations, both are searching ways to reduce and control the consumption. IoT provides a way to not only monitor the energy usage at the appliance-level but also at the house-level, grid level or could be at the distribution level. Smart Meters & Smart Grid are used to monitor energy consumption. It also detects threats to the system performance and stability, which protect appliances from downtime and damages.  **Healthcare Application**: Smartwatches and fitness devices have changed the frequency of health monitoring. People can monitor their own health at regular intervals. Not only this, now if a patient is coming to the hospital by ambulance, by the time he or she reaches the hospital his health report is diagnosed by doctors and the hospital quickly starts the treatment. The data gathered from multiple healthcare applications are now collected and used to analyze different disease and find its cure.  **Education**: IoT provides education aids which helps in fulfilling the gaps in the education industry. It not only improves the quality of education but also optimizes the cost and improves the management by taking into consideration students response and performance.  **Government**: Governments are trying to build smart cities using IoT solutions. IoT enhances armed force systems and services. It provides better security across the borders through inexpensive & high-performance devices. IoT helps government agencies to monitor data in real-time and improve their services like healthcare, transportation, education etc.  **Air and Water Pollution:**Through various sensors, we can detect the pollution in the air and water by frequent sampling. This helps in preventing substantial contamination and related disasters. IoT allows operations to minimize the human intervention in farming analysis and monitoring. Systems automatically detect changes in crops, soil, environment, and more.  **Transportation**: IoT has changed the transportation sector. Now, we have self-driving cars with sensors, traffic lights that can sense the traffic and switch automatically, parking assistance, giving us the location of free parking space etc. Also, various sensors in your vehicle indicate you about the current status of your vehicle, so that you don’t face any issues while travelling.  **Marketing your product**: Using IoT, organizations can better analyze & respond to customer preferences by delivering relevant content and solutions. It helps in improving business strategies in the real-time.  Now that we are aware of the powerful IoT solutions that have been astoundingly impacting various domains, let’s take a deep dive and understand Raspberry Pi, which is commonly used to prepare IoT solutions. After understanding Raspberry Pi we will be creating an IoT application. |