



FACULTY OF ENGINEERING AND TECHNOLOGY

COMPUTER PROGRAMMING

**ASSIGNMENT REPORT ON APPLICATION OF KNOWLEDGE
OBTAINED FROM MODULES ONE TO THREE MAINLY BASED ON
TABLES AND STRUCTURES USING MATLAB**

BY GROUP 12

PRESENTED TO MR. MASERUKA BENEDICTO

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DECLARATION

We as members of group 12 MATLAB, declare that this information in this report is our own, to the best of our knowledge and shows the skills and knowledge obtained through the continuous assignment meetings

APPROVAL

This is to confirm that this report has been written and presented by group 12, given the details of the assignment carried out.

Signature.....

Date.....

Course lecturer.

ACKNOWLEDGEMENT

First and foremost, we would like to thank the Almighty God for giving us the knowledge and guidance while doing our assignment as group 12. We extend our gratitude to all the persons with whose help we managed to make it this far

The love of every group member to invest time and provide all they could to see the assignment a success. Finally, we would like to express our gratitude to all the sources and references that have been cited in this report

ABSTRACT

We started our first meeting for research on 18th September, 2025 in the university library and managed to achieve successful completion of this assignment through group work and division of tasks, and the achieved knowledge through the first assignment we did as a group as a tremendous means of consolidating the knowledge obtained to further the visualization of different parameters, patterns, trends and relationships of various variables represented as detailed plots as per the second assignment.

DEDICATION.

We dedicate this report to all Group 12 members, who have been there with us in the process of researching and doing the and compiling this report. To our lecturer Mr. Maseruka Benedicto whose guidance and expertise have been so needful, your mentorship and lecturing has built our understanding.

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CHAPTER ONE

INTRODUCTION

HISTORICAL BACKGROUND

MATLAB, which stands for matrix laboratory, is a high-performance programming language and environment designed primarily for technical computing. Its origins trace back to the late 1970s when Cleve Moler, a professor of computer science, developed it to provide his students with easy access to mathematical software libraries without requiring them to learn Fortran.

MATLAB is built around the concept of matrices, making it particularly effective for linear algebra and matrix manipulation. It provides a vast library of built-in functions for mathematical operations, statistics, optimization, and other specialized tasks.

MATLAB offers powerful tools for creating 2D and 3D plots, enabling users to visualize data effectively. Specialized toolboxes extend MATLAB's capabilities, providing functions tailored for specific applications like signal processing, image processing, control systems, and machine learning.

MATLAB can interface with other programming languages (like C, C++, and Python) and software tools, allowing for flexible integration into larger systems. Its interactive environment features a command window, workspace, and editor, making it accessible for both beginners and advanced users.

Historical Background

The first version of MATLAB was created in Fortran in the late 1970s as a simple interactive matrix calculator. This early iteration included basic matrix operations and was built on top of two significant mathematical libraries: LINPACK and EISPACK, which were developed for numerical linear algebra and eigenvalue problems, respectively.

Recent versions of MATLAB have introduced features like the *Live Editor*, which allows users to create interactive documents that combine code, output, and formatted text. This evolution reflects MATLAB's ongoing adaptation to meet the needs of its diverse user base across academia and industry.

STUDY METHODOLOGY

At the start, each member was given a task of making research about the assignment before our first meeting. The research concepts were obtained through watching tutorials on YouTube, reading the modules and consultations from other continuing students especially those in year three and four.

ASSIGNMENT ONE.

- a) There's a website called Kaggle.com, each group should be able to retrieve a unique data set in excel format. The group will then read this data set into the mat lab in one code, they will be able to copy variables of each year and put them in the following;
 - i) Tables for each year of data.
 - ii) Convert the tables in (i) into structural arrays
 - iii) Output each of the variables in (ii) above into a single workbook with each year on separate sheets having clear columns headings and sheet names.
- b) Each group has different members from different backgrounds, home districts, courses, religions, tribes, interests, ages, names and facial representation. Write a MATLAB code that can restore each members affirmation attributes into a single variable.

Assignment one.

Question (a)

Retrieve a unique data set from Kaggle.com in excel format.

Write a single MATLAB script to:

1. Read the data set into MATLAB
2. Copy the variables for each year in separate tables
3. Display data for each year on separate tables
4. Convert the tables into structural array

Question 1: **Kaggle.com Dataset Categorization.**

The primary objective of this exercise was to create a MATLAB script suitable for handling an external dataset. Our approach was a three-step process.

Methodology's

Data Acquisition and Import: We sourced a unique dataset from Kaggle in Excel format. The MATLAB script was designed to use a function to read the entire .csv file, ensuring all data was available for processing. Our exercise required that the data be of a variety containing a field for the year.

We chose a dataset of Indian Water for three years. We went ahead to clean the data in Excel in order to remove records with missing values and, remove records with uncoherent data as well. Once the data was clean and usable, our next step was to import it into our MATLAB environment.

For that we added the dataset file into our exercise folder for convenience purposes, imported it to MATLAB and proceeded with further processing. **Data Processing:** Our end task was to structure the data into separate years maintaining the structure of the individual years' data while

keeping each individual year separate. To do this we used the MATLAB script to access the field labelled "Year" and extract unique values. These are the different years that our data has, repeated across multiple records. For our next step, we utilized the loop feature of MATLAB to iterate over our dataset while extracting the records of data that match each of the unique years; for every unique year! Once we had extracted records of the year of interest, we converted the resulting filtered table into a structural array; and added it to a worksheet in our target Excel workbook. At the end of the iteration, we had an Excel workbook with different sheets corresponding to different years of Indian Water data. This final step required the script to output the structured data back into a single Excel workbook. Using MATLAB's built-in functions, we created an Excel

Workbook and to achieve the separation of the worksheets we used a property called Sheet, and assigned the respective years as sheet names. This ensures the output is easy for a human to interpret.

DATASET ABOUT INDIAN WATER

Extracting of the from the file;

```
Indian = readtable("Indian_water_data.csv","ReadVariableNames",true);  
disp(Indian);
```

Separating data for each year into different tables

```
IN_2021 = Indian(Indian.Year == 2021, :);  
IN_2022 = Indian(Indian.Year == 2022, :);  
IN_2023 = Indian(Indian.Year == 2023, :);
```

constructing arrays for every year

```
INa_2021 = table2struct(IN_2021);  
INa_2022 = table2struct(IN_2022);  
INa_2023 = table2struct(IN_2023);
```

converting arrays into tables for export

```
IN2_2021 = struct2table(INa_2021);  
IN2_2022 = struct2table(INa_2022);  
IN2_2023 = struct2table(INa_2023);
```

Compiling of the variables into one worksheet

```
writetable(IN2_2021,"ASSIGNMENT_TABLE.xlsx","Sheet","2021","WriteVariableNames"  
,true);  
writetable(IN2_2022,"ASSIGNMENT_TABLE.xlsx","Sheet","2022","WriteVariableNames"  
,true);  
writetable(IN2_2023,"ASSIGNMENT_TABLE.xlsx","Sheet","2023","WriteVariableNames"  
,true)
```

Exercise 2: Group Member Data Storage

This exercise focused on a different aspect of data management: structuring varied data types into a single variable. The task was to take a set of attributes for each group member including home district, religion, tribe, interests, age, name, and a description for facial representation and store them collectively.

To accomplish this, we chose to utilize a structural array. Each element of the array represents a single group member, and each field within that element (e.g., Name, Age, interests) holds the corresponding attribute. This approach allows for logical grouping of related data and simplifies future access and manipulation of the information.

Our main task here was to get the data into the MATLAB environment, for that we utilized the MATLAB input feature. Using a script, we prompted the user to enter values for the attributes of the different group members; again, we utilized a loop for this. First, we prompted the user to enter the group size, in terms of number of members; and iterated the attribute prompts for each of the members

Below is the code for the MATLAB script we used to achieve the intended outcome of the exercise. Code for our MATLAB script for exercise 2

```
NAME = ["AGABA JOSHUA"; "OBBO DANIEL"; "GINAH RUTH"; "MIREMBE ROSE"; "ISABIRIYE EDMOND"; "APIO MIRRIAM"; "IWASAMPIJJA MIKE CRISPUS"; "TANGA RIGAN"; "WANDABA ELVIS"];
TRIBAL_BACKGROUND = ["MUGISU"; "JAPADHOLA"; "JAPADHOLA"; "MUNSOGA"; "MUSOGA"; "ITESOT"; "MUGANDA"; "SAMIA"; "MUGISU"];
DISTRICT = ["BUDUDA"; "TORORO"; "TORORO"; "BUYENDE"; "IGANGA"; "SOROTI"; "BUKOMANSIMBI"; "BUSIA"; "NAMISIDWA"];
RELIGION = ["BORN AGAIN"; "CATHOLIC"; "ANGLICAN"; "BORN AGAIN"; "CATHOLIC"; "CATHOLIC"; "ANGLICAN"; "BORN AGAIN"; "PENTACOSTAL"];
COURSE = ["WAR"; "WAR"; "PTI"; "WAR"; "AMI"; "WAR"; "AMI"; "WAR"; "WAR"];
INTERESTS = ["BADMINTON"; "DRIVING"; "DANCING"; "READING"; "SINGING"; "PLAYING"; "PRAYING"; "READING NOVELS"; "GYMING"];
AGE = [21; 20; 20; 22; 21; 20; 21; 22; 23];
FACIAL_REPRESENTATION = {imread("AGABA.jpg"); imread("OBBO.jpg");
imread("GINAH.jpg"); imread("MIREMBE.jpg"); imread("ISABIRIYE.jpg");
imread("APIO.jpg"); imread("IWASAMPIJJA.jpg"); imread("TANGA.jpg");
imread("WANDABA.jpg")};
STUDENTS_DATA =
table(NAME,TRIBAL_BACKGROUND,DISTRICT,RELIGION,COURSE,INTERESTS,AGE,FACIAL_REPRESENT
ATION);
disp(STUDENTS_DATA);
```

NAME	TRIBAL_BACKGROUND	DISTRICT	RELIGION	COURSE	INTERESTS
"AGABA JOSHUA"	"MUGISU"	"BUDUDA"	"BORN AGAIN"	"WAR"	"BADMINTON"
"OBBO DANIEL"	"JAPADHOLA"	"TORORO"	"CATHOLIC"	"WAR"	"DRIVING"
"GINAH RUTH"	"JAPADHOLA"	"TORORO"	"ANGLICAN"	"PTI"	"DANCING"
"MIREMBE ROSE"	"MUNSOGA"	"BUYENDE"	"BORN AGAIN"	"WAR"	"READING"
"ISABIRIYE EDMOND"	"MUSOGA"	"IGANGA"	"CATHOLIC"	"AMI"	"SINGING"
"APIO MIRRIAM"	"ITESOT"	"SOROTI"	"CATHOLIC"	"WAR"	"PLAYING"
"IWASAMPIJJA MIKE CRISPUS"	"MUGANDA"	"BUKOMANSIMBI"	"ANGLICAN"	"AMI"	"PRAYING"
"TANGA RIGAN"	"SAMIA"	"BUSIA"	"BORN AGAIN"	"WAR"	"READING NOVELS"
"WANDABA ELVIS"	"MUGISU"	"NAMISIDWA"	"PENTACOSTAL"	"WAR"	"GYMING"

```
save("TEST.mat","STUDENTS_DATA")
```

Chapter 3: Conclusion and Learning Experience

Completing this assignment was a valuable learning experience that reinforced key MATLAB programming concepts and gave us hands-on experience with the foundations we had acquired from Modules 1 to 3. We gained a deeper understanding of how to handle real-world data, which we realized is often messy and requires careful structuring. The process of importing from a third-party source like Kaggle, transforming the data into a more usable format like a structural array, and then exporting it cleanly highlighted a complete data workflow. The second exercise also re-enforced our knowledge of data types and the use of structural arrays in organizing heterogeneous information. The assignment as a whole provided a practical foundation in data management and problem-solving within a technical computing environment.