MEDICAL PHYSICS

Second Stage

Lec6

MATRIX & ARRAY OPERATIONS

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The matrix consists of a number of rows and a number of columns, each of which is symbolized by a transformation. We use matrices in many engineering applications to solve complex problems. The elements of the matrix can be real or complex values, and the rows are usually symbolized by

MATRICNAME(M,N)

Where: **m** is the number of rows, **n** is the number of columns.

- Create a (4,4) matrix named A

A = [3 4 4 3 ; 4 5 6 7 ; 5 6 7 4 ; 4 5 6 7]

3	4	4	3
4	5	6	7
5	6	7	4
4	5	6	7

-RECALL AN ELEMENT FROM AN ARRAY BY ROW NUMBER AND COLUMN NUMBER.

To call the second element from the third row, we write:

For example

A(3,2) ans = 6

- RECALL AN ELEMENT FROM AN ARRAY BY SORTING IT.

A(8) ans = 5

*Where counting is done from the top of the column to the bottom and in order.

- Recall a row from an

array. A(3,:) ans = 5 6 7 4

- RECALL A COLUMN FROM AN ARRAY.

A(:,4)

Ans =

3

7

4

7

- RECALL THE SECOND ROW THAT CONTAINS THE LAST THREE ELEMENTS (WITHOUT THE FIRST ELEMENT).

A(2,2:4) ans = 5 6 7

- RECALL THE FIRST AND LAST ELEMENTS OF THE THIRD ROW.

A(3,1:3:4) ans = 5 4

- ADD A COLUMN AT THE END OF THE ARRAY.

A(:,5) = [3 5 0 0]

3	4	4	3	3
4	5	6	7	5
5	6	7	4	0
4	5	6	7	0

- Delete the second column from the new matrix.

A(:,2)= [ ]

The matrix becomes as shown

3	4	3	3
4	6	7	5
5	7	4	0
4	6	7	0

- REPLACE AN ELEMENT OF THE MATRIX WITH A NEW ELEMENT.

A(3,4) = 11

The matrix becomes as shown

3	4	3	3
4	6	7	5
5	7	4	11
4	6	7	0

Additional Matrix Operations in MATLAB

sum_all = sum(A(:)); Calculates the total sum of all elements in matrix A.

row_sum = sum(A, 2); Calculates the sum of each row in matrix A.

col_sum = sum(A, 1); Calculates the sum of each column in matrix A.

row_mean = mean(A, 2); Calculates the average of each row.

col_mean = mean(A, 1); Calculates the average of each column.

max_val = max(A(:)); Finds the largest value in the matrix.

min_val = min(A(:)); Finds the smallest value in the matrix.

sorted_A = sort(A(:)); Sorts all matrix elements in ascending order.

flip_h = fliplr(A); Flips the matrix horizontally (left to right).

flip_v = flipud(A); Flips the matrix vertically (top to bottom).

rotated_A = rot90(A); Rotates the matrix 90 degrees counterclockwise.

A_transpose = A'; Transposes the matrix (rows become columns).


THANK YOU