MATLAB Data types

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Course Code: Image Processing and Analysis

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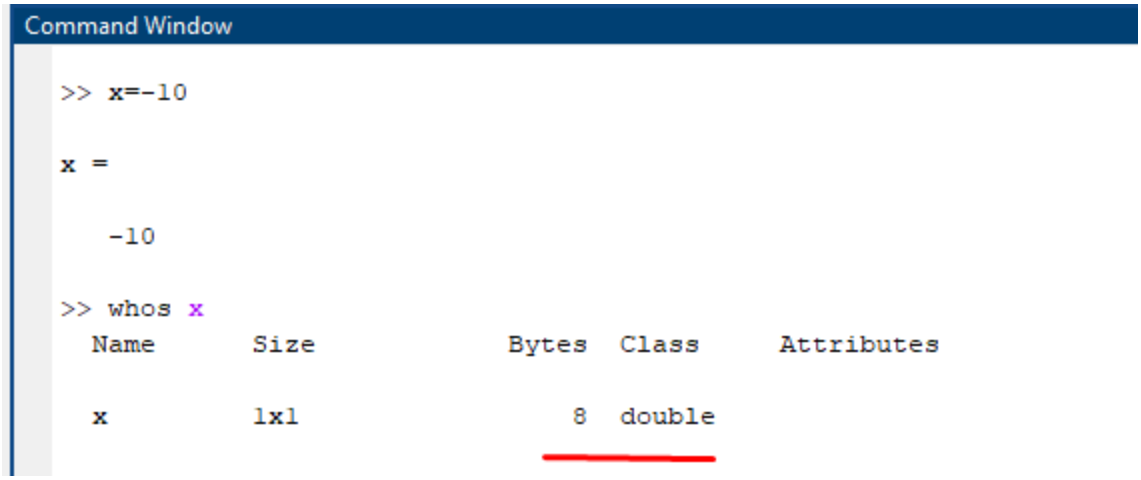
Write a short note on

1. Double

Double is the default numeric data type. It provides sufficient precision for most computational tasks. In MATLAB, numeric variables are automatically stored as 64-bit (8-byte) double-precision floating-point values.

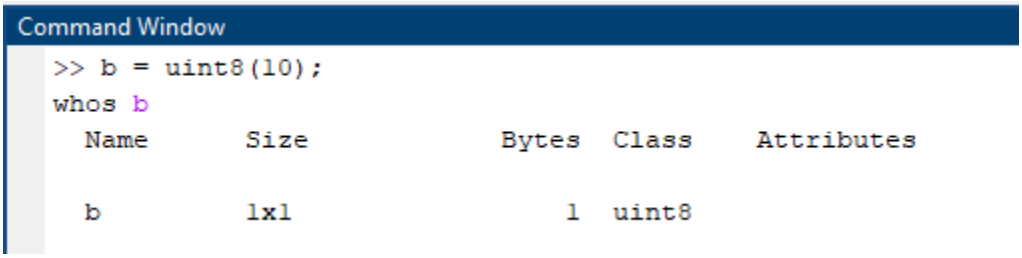


2. uint8

Uint8 is a numeric data type. Uint8 stands for:

- **U:** it refers than it is Unsigned which means that all values are positive. (no negative sign is allowed)
- **Int:** it refers to Integers which means all values are whole numbers.
- **8:** It refers to the size that it consists of only 8 bits of information.

In uint8, the range of values is [0,255].



3. uint16

Uint16 is a numeric data type. Uint16 stands for:

- **U:** it refers than it is Unsigned which means that all values are positive. (no negative sign is allowed)
- **Int:** it refers to Integers which means all values are whole numbers.

- **16:** It refers to the size that it consists of only 16 bits (2 Byte) of information.

In uint16, the range of values is [0, 65535].

```
Command Window
>> c= uint16(5);
whos c
  Name        Size              Bytes  Class     Attributes

  c           1x1                   2  uint16
```

4. uint32

Uint32 is a numeric data type. Uint32 stands for:

- **U:** it refers than it is Unsigned which means that all values are positive. (no negative sign is allowed)
- **Int:** it refers to Integers which means all values are whole numbers.
- **32:** It refers to the size that it consists of only 32 bits (4 Byte) of information.

In uint32, the range of values is [0, 4,294,967,295].

```
Command Window
>> d=uint32(5);
whos d
  Name        Size              Bytes  Class     Attributes

  d           1x1                   4  uint32
...
```

5. int8

Int8 is a numeric data type. It ranges from -128 to +127. It is signed integer, consists of both negative and positive value. Its size is 8 bit (1 Byte).

```
Command Window
>> e=int8(5);
whos e
  Name        Size              Bytes  Class    Attributes

  e           1x1                   1  int8
```

6. int16

Int16 is a numeric data type. It ranges from -32,768 to 32,767. It is signed integer, consists of both negative and positive value. Its size is 16 bit (2 Byte).

```
Command Window
>> e=int16(5);
whos e
  Name        Size              Bytes  Class    Attributes

  e           1x1                   2  int16
```

7. int32

Int32 is a numeric data type. It ranges from -32,768 to 32,767. It is signed integer, consists of both negative and positive value. Its size is 32 bit (4 Byte).

```
Command Window
>> e=int32(5);
>> whos e
  Name        Size              Bytes  Class    Attributes

  e           1x1                   4  int32
```

8. Single

Single-precision are stored as 32-bit (4 byte) floating-point values of data type (class) single. It is sufficient for many computational problems. In addition, single precision uses half the memory, and is generally twice as fast.

```
Command Window
>> f= single(10);
whos f
  Name        Size              Bytes  Class     Attributes

  f           1x1                   4  single
```

9. Char

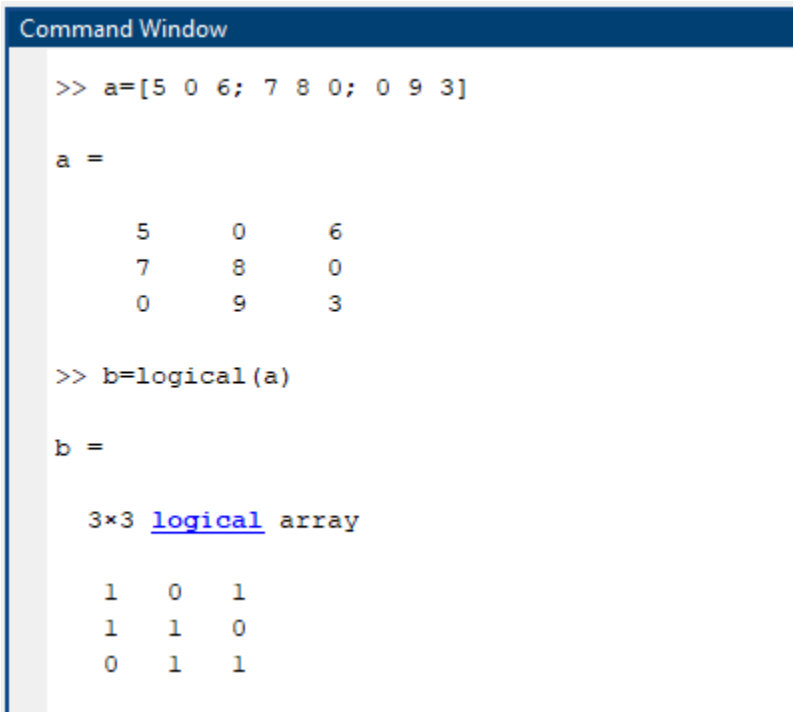
A character array is a sequence of characters, just as a numeric array is a sequence of numbers. A typical use is to store a short piece of text as a row of characters in a *character vector*.

```
Command Window
>> c='H';
>> whos c
  Name        Size              Bytes  Class    Attributes

  c           1x1                   2  char
```

10. Logical

It is a data type for logical values. Any nonzero element of array is converted to logical 1 (true) and zeros are converted to logical 0 (false). Complex values and NaNs cannot be converted to logical values and result in a conversion error.



Why Matlab read images as uint8 but not as a double value?

Because the value range of uint8 is 0 to 255 while the double value ranges from 0 to 1. Uint8 is used unsigned 8 bit integer which is the range of pixel. We can't have pixel value more than 2^8 -1. Therefore, for images uint8 type is used. Whereas double is used to handle very big numbers.