Addition of NumPy array is different from that of a python list.

```
x = np.array([1, 2, 3])
y = np.array([4, 5, 6])

z = x + y
z
```

```
array([5, 7, 9])
```

```
l1 = [1,2,3]
l2 = [4,5,6]
z = l1+l2
z
```

```
[1, 2, 3, 4, 5, 6]
```

Arrays are basically matrices of n dimensions. And all matrix operations can be performed on arrays whereas python list works absolutely differently.

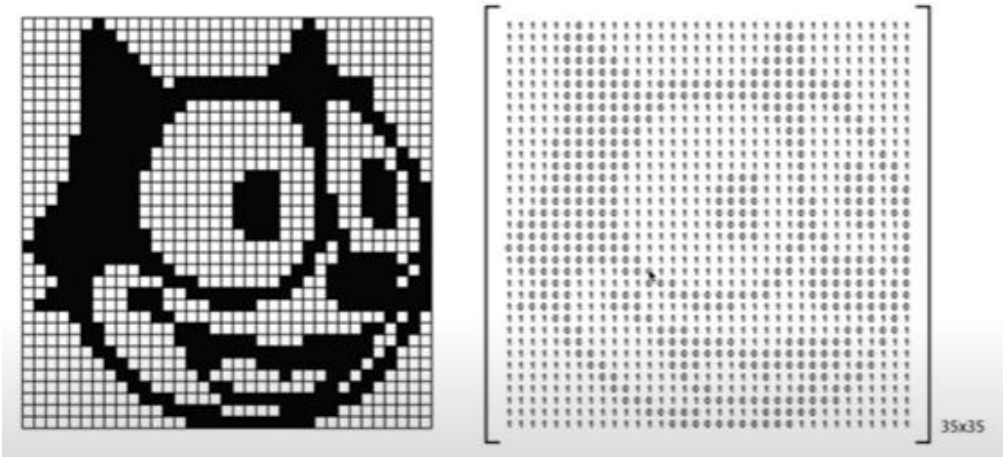
Vectors are one-dimensional arrays while matrices are two-dimensional arrays.

Row wise addition and column wise addition of arrays of n dim:

M is the matrix and b is a vector

- Row-wise
  - `M + b`
- Column-wise:
  - Make `b` a column vector or a `(m, 1)` matrix using `np.expand_dims`
  - `M + b`

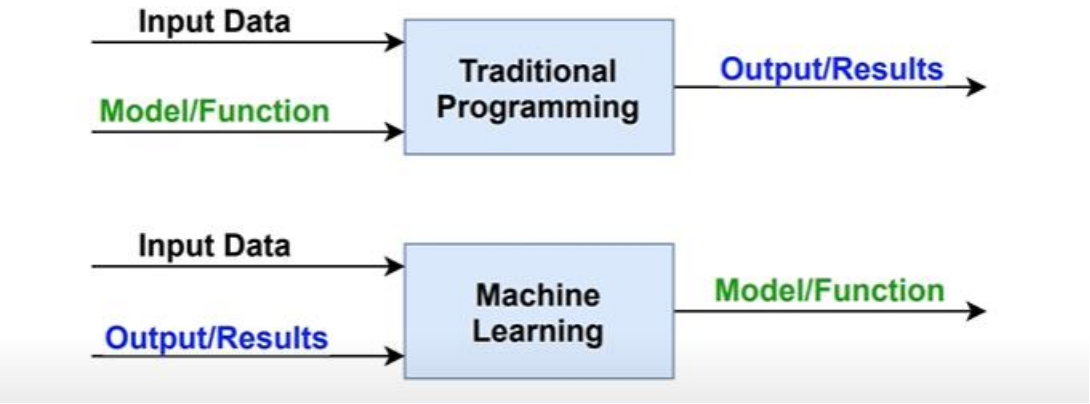
An image is a matrix of number:



1 represents white color, 0 represents black color of the picture in the 35 X 35 matrix.

Training data:

Once the model or the output is learnt, traditional programming can be used to get output for a given input model.



Five important steps to build any machine learning model are:

- Training data
- Model
- Loss function
- Optimization procedure
- Evaluation criteria

In supervised learning we have input(features) and output(label) data. If the input data is in an image or text format then we convert that into numbers which are readable to the computer.

Like if the inputs are images  then these images are converted into matrix, further we have their corresponding labels.

Label can be in the form of real values, discrete values, two value(yes/no)

Models is a mathematical relo b/w output and input. We choose our models depending on the nature of the output. If the output is a real value then regression, if it is a discrete value then we choose classification model