
# Linear Algebra

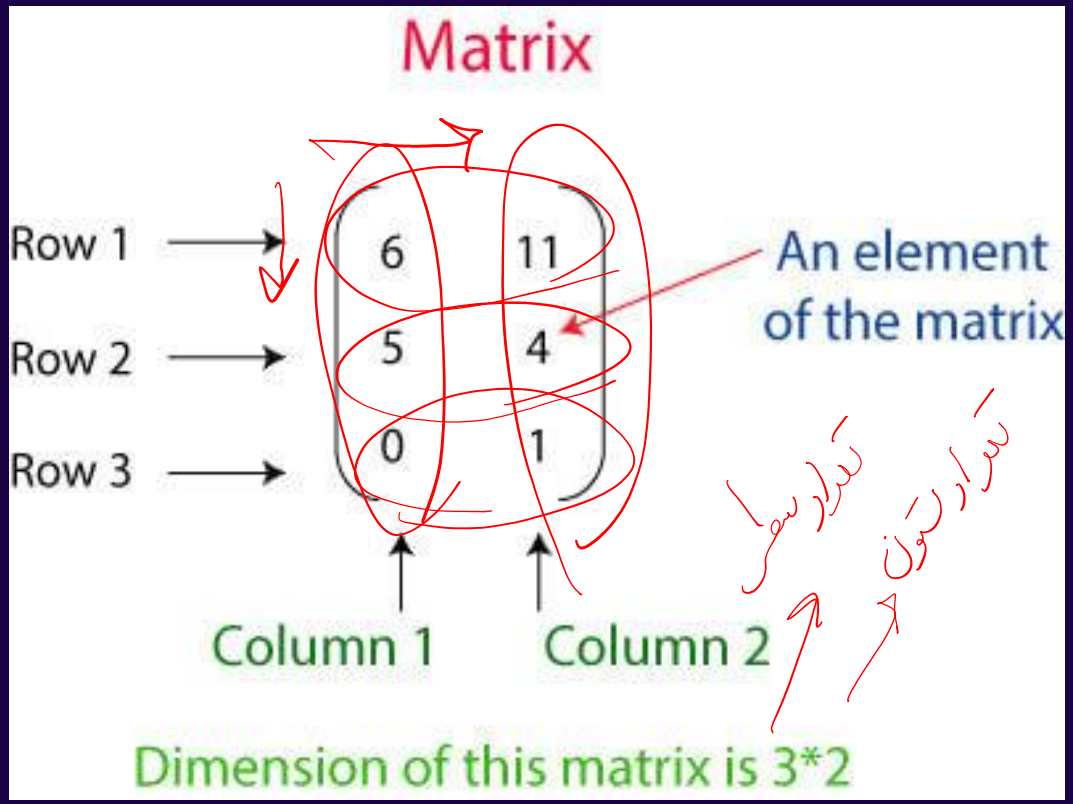
# Matrices

By Roghaye Faraji

# In This Video

- Definition of Matrices
- Importance of Matrices
- Example of Matrix Calculation

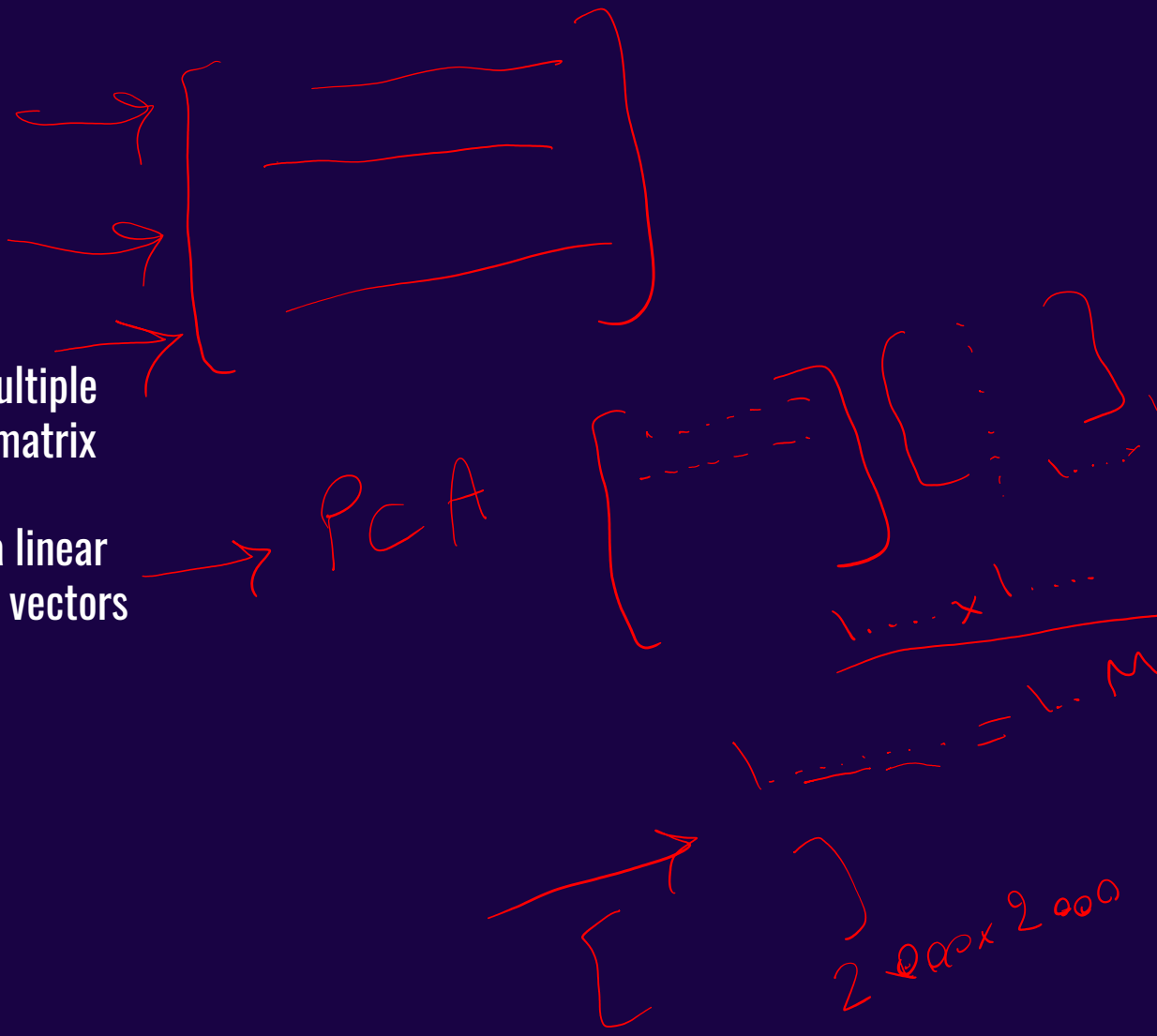
# What is Matrices




A matrix is a two-dimensional collection of numbers.

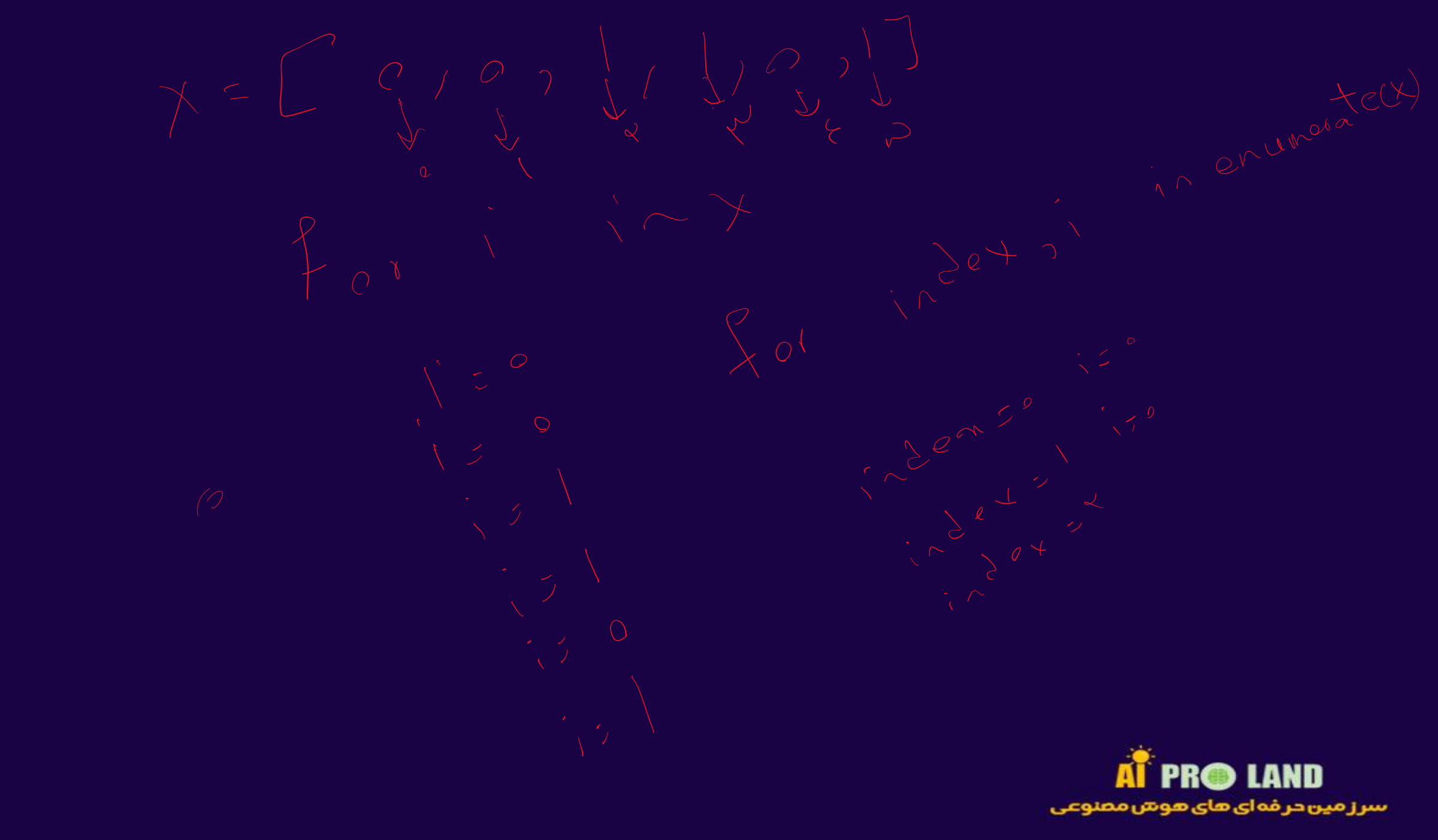
# Importance of Matrices

- we can use a matrix to represent a dataset consisting of multiple vectors, simply by considering each vector as a row of the matrix
- as we'll see later, we can use an n × k matrix to represent a linear function that maps k-dimensional vectors to n-dimensional vectors
- matrices can be used to represent binary relationships



# Example of Matrix Calculation

```
friend_matrix = [[0, 1, 1, 0, 0, 0, 0, 0, 0, 0],   # user 0
                 [1, 0, 1, 1, 0, 0, 0, 0, 0, 0],   # user 1
                 [1, 1, 0, 1, 0, 0, 0, 0, 0, 0],   # user 2
                 [0, 1, 1, 0, 1, 0, 0, 0, 0, 0],   # user 3
                 [0, 0, 0, 1, 0, 1, 0, 0, 0, 0],   # user 4
                 [0, 0, 0, 0, 1, 0, 1, 1, 0, 0],   # user 5
                 [0, 0, 0, 0, 0, 1, 0, 0, 1, 0],   # user 6
                 [0, 0, 0, 0, 0, 1, 0, 0, 1, 0],   # user 7
                 [0, 0, 0, 0, 0, 0, 1, 1, 0, 1],   # user 8
                 [0, 0, 0, 0, 0, 0, 0, 0, 1, 0]]   # user 9
```



# Exercise :

## In the last example ,Find a user who have the most friends

```
friend_matrix = [[0, 1, 1, 0, 0, 0, 0, 0, 0, 0],  # user 0
                 [1, 0, 1, 1, 0, 0, 0, 0, 0, 0],  # user 1
                 [1, 1, 0, 1, 0, 0, 0, 0, 0, 0],  # user 2
                 [0, 1, 1, 0, 1, 0, 0, 0, 0, 0],  # user 3
                 [0, 0, 0, 1, 0, 1, 0, 0, 0, 0],  # user 4
                 [0, 0, 0, 0, 1, 0, 1, 1, 0, 0],  # user 5
                 [0, 0, 0, 0, 0, 1, 0, 0, 1, 0],  # user 6
                 [0, 0, 0, 0, 0, 1, 0, 0, 1, 0],  # user 7
                 [0, 0, 0, 0, 0, 0, 1, 1, 0, 1],  # user 8
                 [0, 0, 0, 0, 0, 0, 0, 0, 1, 0]]  # user 9
```