

# Introducción a Network Analytics

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# Basic

Graph is a data structure and is defined by  $G = (V, E)$ , where  $V$  is the set of nodes and  $E$  is the set of edges.

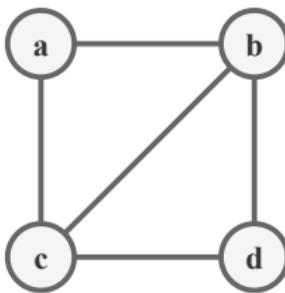


Figure 1: Graph example.

## Two columns

- Homogeneous graph
- Heterogeneous graph
- Directed graph
- Undirected graph
- Weighted graph
- Bipartite graph
- Complete graph
- Degree
- Density
- Diameter

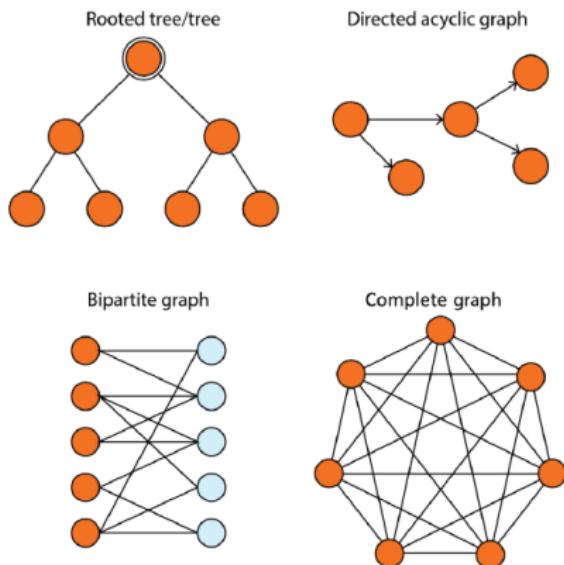


Figure 2: Common type of graphs.  
Adapted from [?].

## Items multicolumns

- Computer vision
- Natural language processing
- Recommender systems
- Program analysis
- Knowledge graphs
- Bioinformatics
- Chemistry
- Biology
- Physic
- Anomaly detection
- Urban intelligence
- Financial transaction
- ...

# Items and subitems

① Class 1

- A

② Class 2

- B

③ Class 3

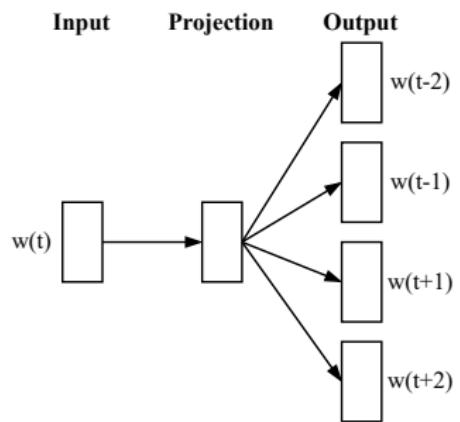
- C

n+e Student 1

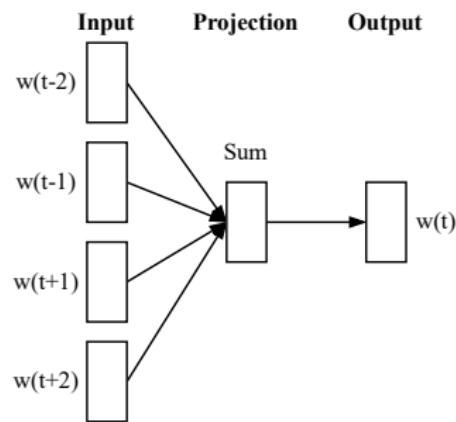
- C-1



# Subfigures



(a) Skip-gram.



(b) CBOW.

**Figure 3:** Word embedding architectures. Adapted from [?].

# Equations

$$V = \frac{4}{3}\pi r^3 \quad (1)$$

## Equation without numbers

$$J(\theta) = \mathbb{E}_{\pi_\theta}[G_t] = \sum_{s \in \mathcal{S}} d^\pi(s) V^\pi(s) = \sum_{s \in \mathcal{S}} d^\pi(s) \sum_{a \in \mathcal{A}} \pi_\theta(a|s) Q^\pi(s, a) \quad (2)$$

$$\cos(\theta) = \text{sim}(z_i, z_j) = \frac{z_i \cdot z_j}{\|z_i\| \|z_j\|} \quad (3)$$

## Equations multiline

### Equation with numbers

$$\begin{aligned} A = & \lim_{n \rightarrow \infty} \Delta x \left( a^2 + \left( a^2 + 2a\Delta x + (\Delta x)^2 \right) \right. \\ & + \left( a^2 + 2 \cdot 2a\Delta x + 2^2 (\Delta x)^2 \right) \\ & + \left( a^2 + 2 \cdot 3a\Delta x + 3^2 (\Delta x)^2 \right) \\ & + \dots \\ & \left. + \left( a^2 + 2 \cdot (n-1)a\Delta x + (n-1)^2 (\Delta x)^2 \right) \right) \\ & = \frac{1}{3} (b^3 - a^3) \quad (4) \end{aligned}$$

# Algorithm

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## Algorithm 1: Find Maximum Element in an Array.

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**Input :** An array  $A$  of  $n$  integers

**Output:** Maximum element in the array

```
1   $y \leftarrow 1$ 
2   $X \leftarrow x$ 
3   $N \leftarrow n$ 
4  while  $N \neq 0$  do
5      if  $N$  is even then
6           $X \leftarrow X \times X$ 
7           $N \leftarrow \frac{N}{2}$                                 /* This is a comment */
8      else
9          if  $N$  is odd then
10              $y \leftarrow y \times X$ 
11              $N \leftarrow N - 1$ 
12 return max
```

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# Tables

Table 1: Definition.

Eq.	Def.	A	B	C
1	4.0	0	1	4.0
2	3.7	7	7	6.99

Please check the definition of Equation (??) in Table ??.

# Figures

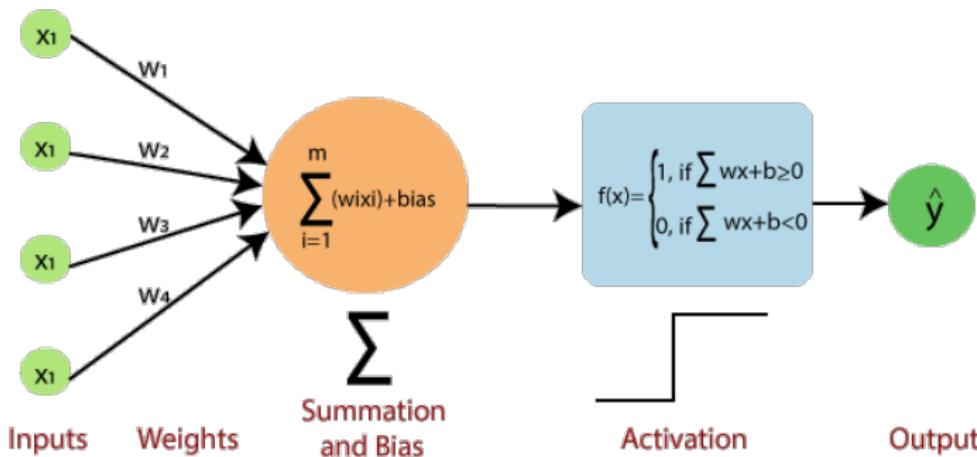


Figure 4: Basic NN.

From <https://www.javatpoint.com/single-layer-perceptron-in-tensorflow>.

# Video

Figure 5: Image classification. From  
<https://www.3blue1brown.com/lessons/neural-networks>.

*Thank you for your attention!*  
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