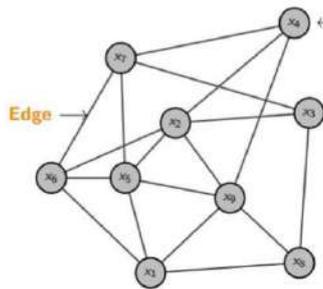


## Topic: Graph Learning for EEG Classification

### 1. Graph data

Graph data is one of the **most ubiquitous data structure** (social network, biological network, etc.,)



Graphs: **edges** encode relationships between **nodes** (representing entities, or variables)

For instance: in a social network, entities (**nodes**) are people, an **edge** exist between two nodes if two people are friend!

### 2. Graph Learning

**Objectives:** Learn the underlying connectivity from samples

$$\mathbf{X} = [x_1, x_2, \dots, x_p]^T$$

**Methodology:** Build a graph learning framework

$$\begin{aligned} &\text{minimize} && \mathcal{L}(\mathbf{X}, \Theta) \\ &\text{subject to} && \Theta \in \mathcal{M} \end{aligned}$$

where  $\Theta$  is model parameter (precision matrix) encoding the graph structures,  
 $\mathcal{L}$  is a loss function

### 3. Applications

→ Data Visualization

→ EEG Signal Classification (graph as a feature)

### Conclusions

→ Developing the most efficient graph learning framework to exploit underlying topology from raw data

→ The exploited topology is used as an important feature for subsequent Machine Learning model in enhancing the classification accuracy, data inference, etc.,