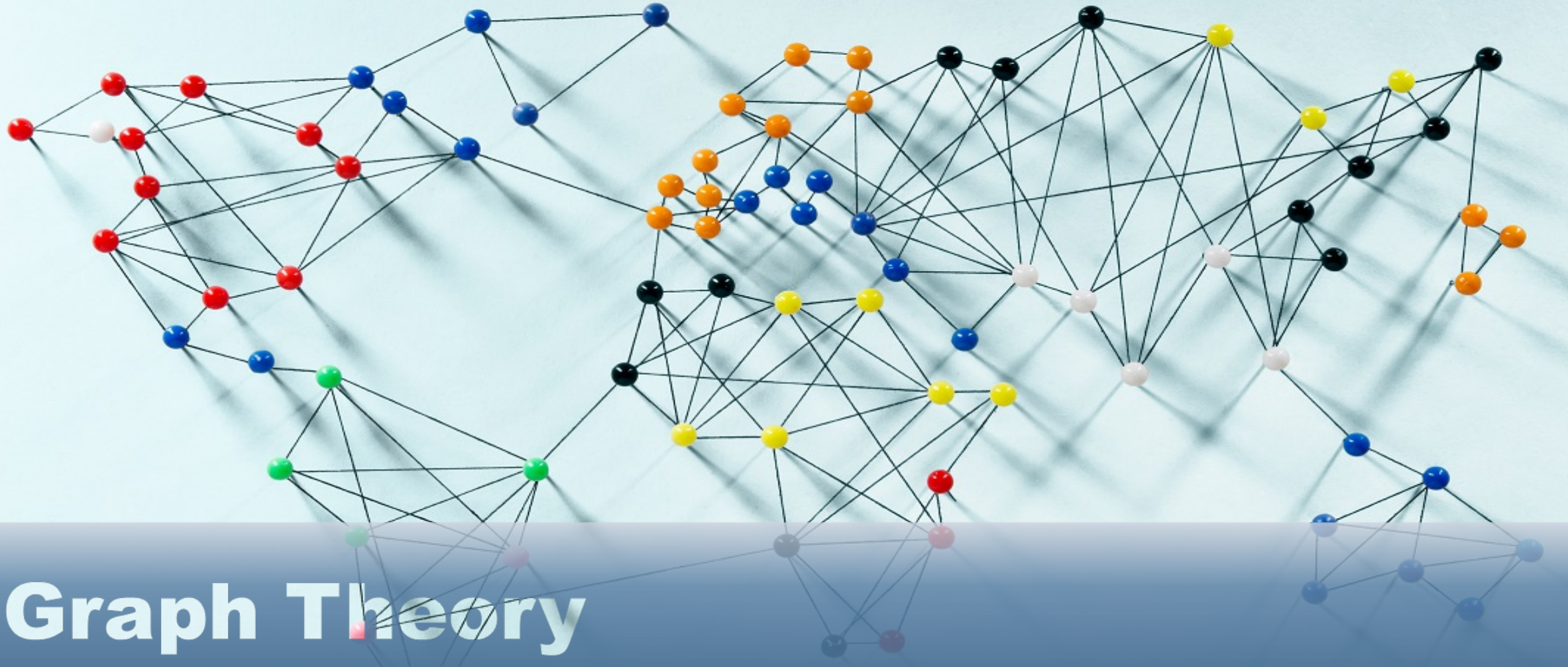


Graph Theory and its implementation in board games

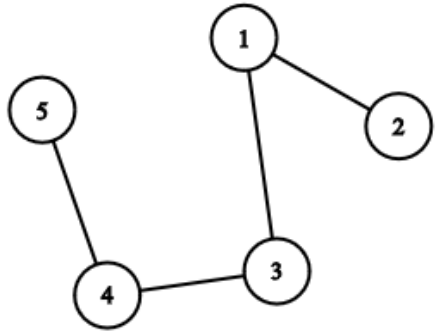
Ibrahim Butt 24043
Muhammad Tahir Ahmed 24151
Ammara Khan 24133
Sara Abid 24112
Israr Hussain 24045

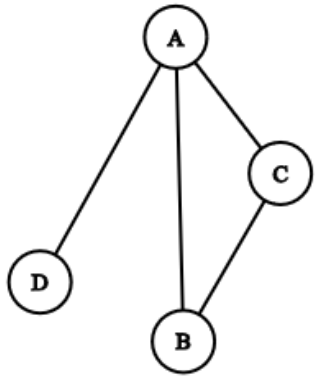
GRAPH : a list of pairs of “things” called vertex/vertices, and lines between those points, called edges

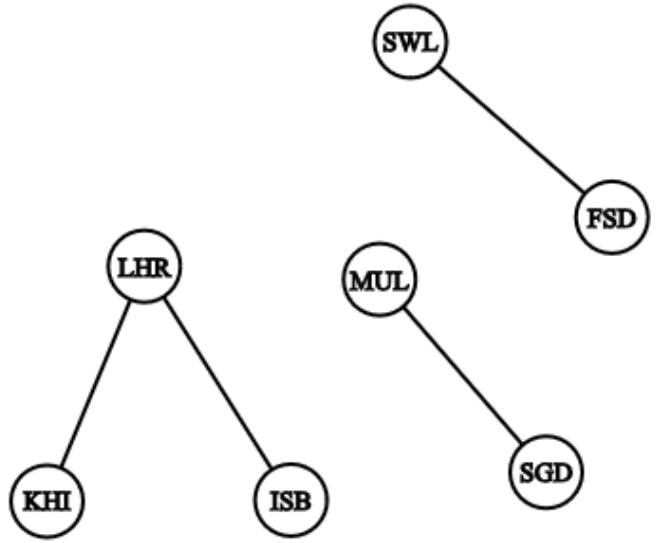
◆◆ = {(1, 2), (1, 3), (3, 4), (4, 5)}

◆◆ = {(A, B), (B, C), (A, C), (A, D)}

◆◆ = {(LHR,KRA), (LHR,ISB), (FSD,SWL), (STD,MUL)}







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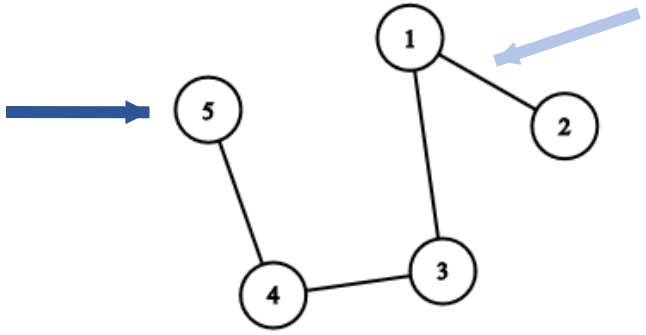

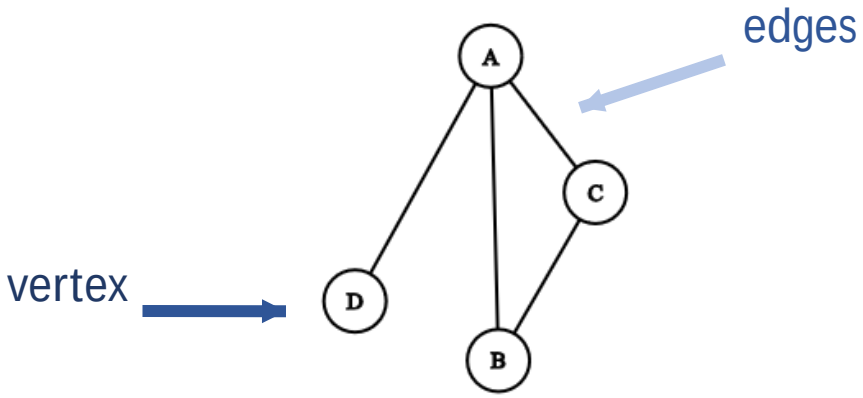

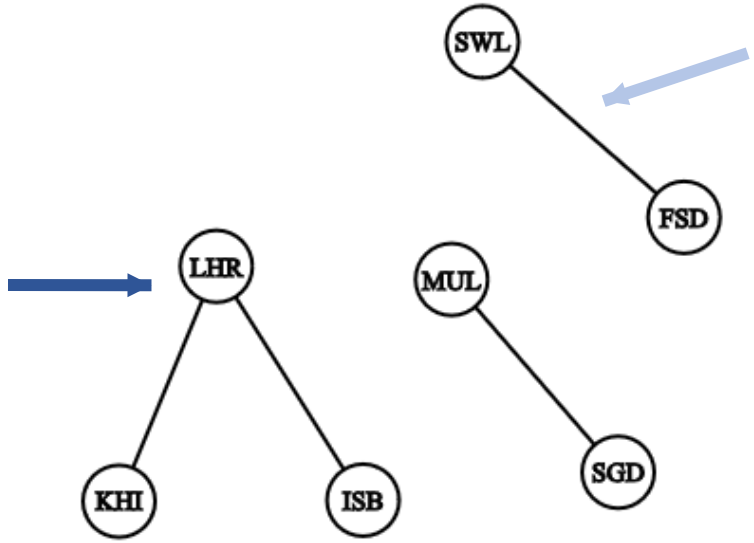

GRAPH : a list of pairs of “things” called vertex/vertices, and lines between those points, called edges

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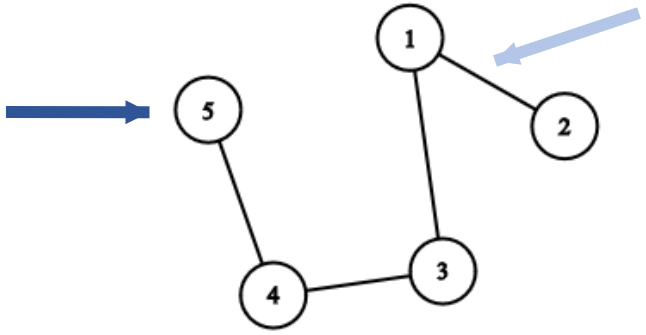
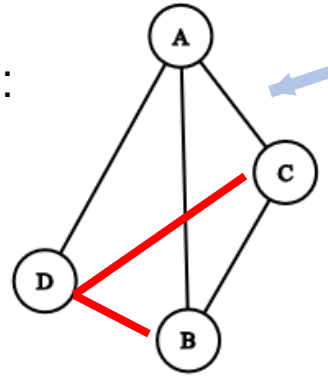
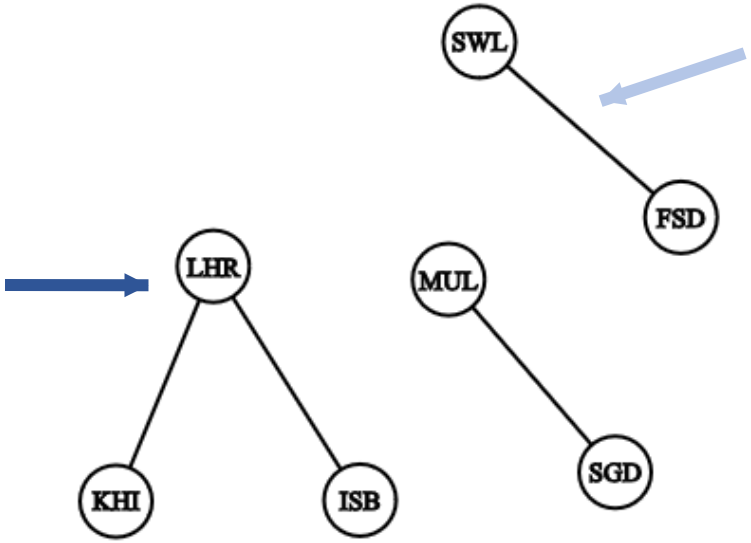


Total edges:
(n(n-1))/2

edges

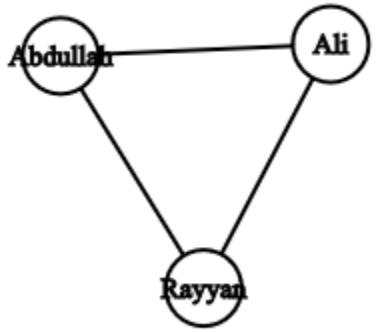
vertex



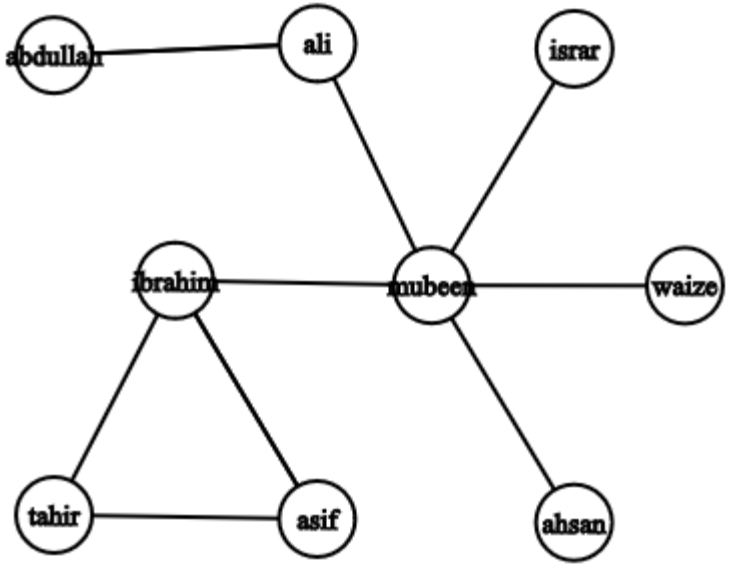


Difference between Directed and undirected graphs?

Siblings Relation



Instagram followers



Difference between Directed and undirected graphs?

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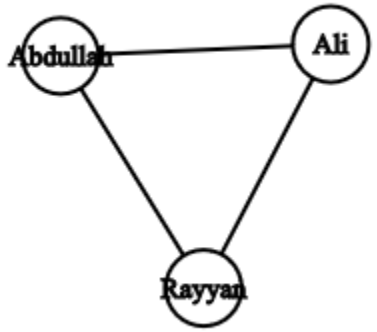

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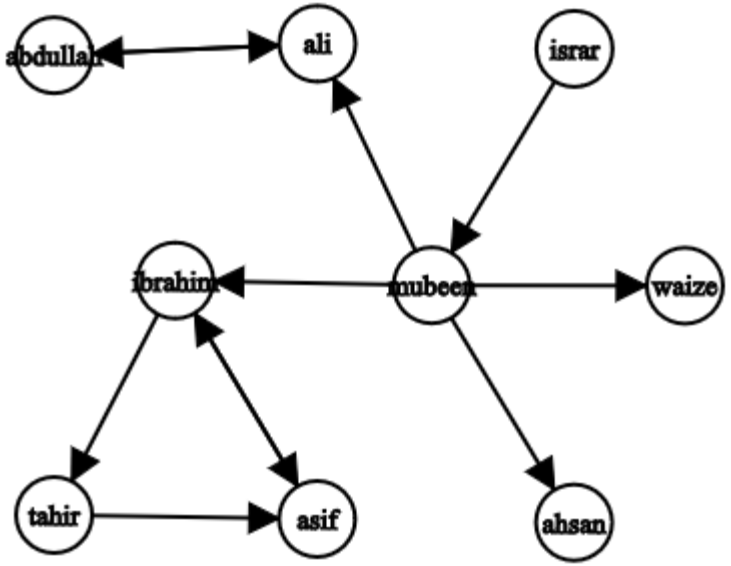


GRAPH REPRESENTATION

1. Edge List
    1. Individual track of all edges
    2. Need to check all edges

2. Adjacency List
    1. Track of all adjacent to a particular edge
    2. Need to check relevant list of adjacent

3. Adjacency Matrix
    1. Table in form of rows and columns that keep track of all possible edges in terms of YES/NO
    2. Only need to check one cell.

Things we need for our area of research:

1. How to traverse a graph
2. Count neighbors of a vertex
3. Count degree of a vertex(number of edges meeting at that vertex)
4. Deleting and inserting edges
5. Path and cycle of vertices

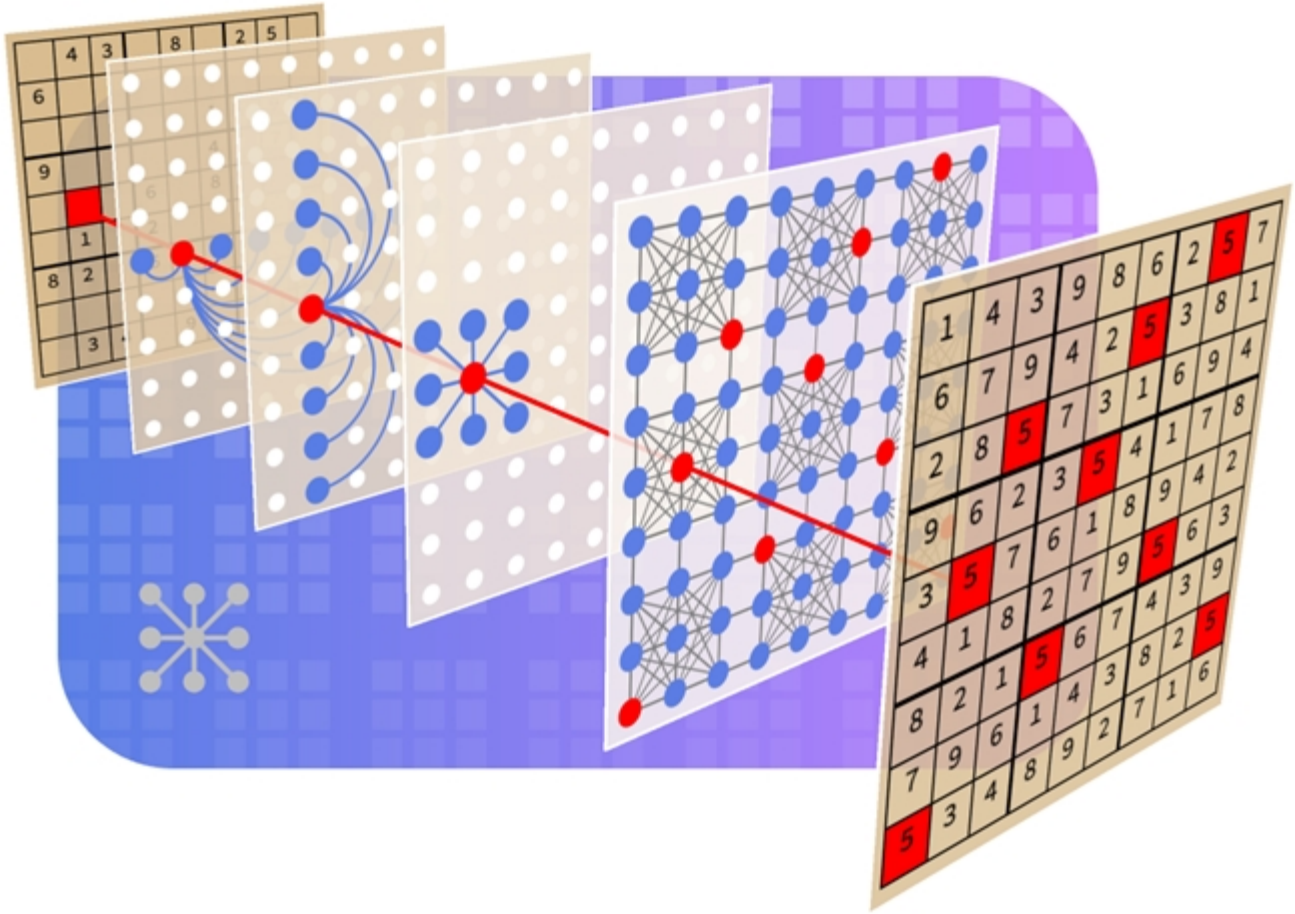
Graph in Board Games

Most board games are played two-dimensional grid.

- Nodes represent the cells where game pieces are placed.
- Winning conditions involve finding paths (edges) with consecutive stones.

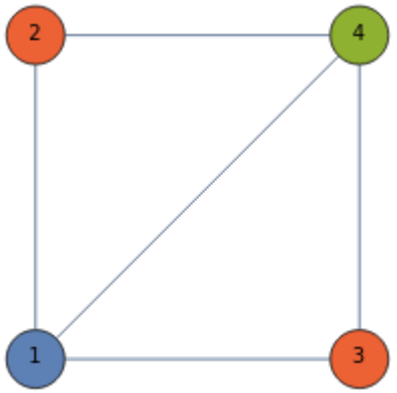
Implementation

Topics like graph theory, and recursion play crucial roles in modeling and solving the game.



Graph Coloring in Board Games

- involves assigning different colors to the vertices of a graph such that no two adjacent vertices share the same color.
- Simplifies game design by managing player interactions and organizing regions.



1. Territory Colouring: Assigning different colours to neighbouring territories.
2. Player moves: Useful in multiplayer games to minimize conflicts.
3. Puzzle Solving: No two adjacent players have the same colours.