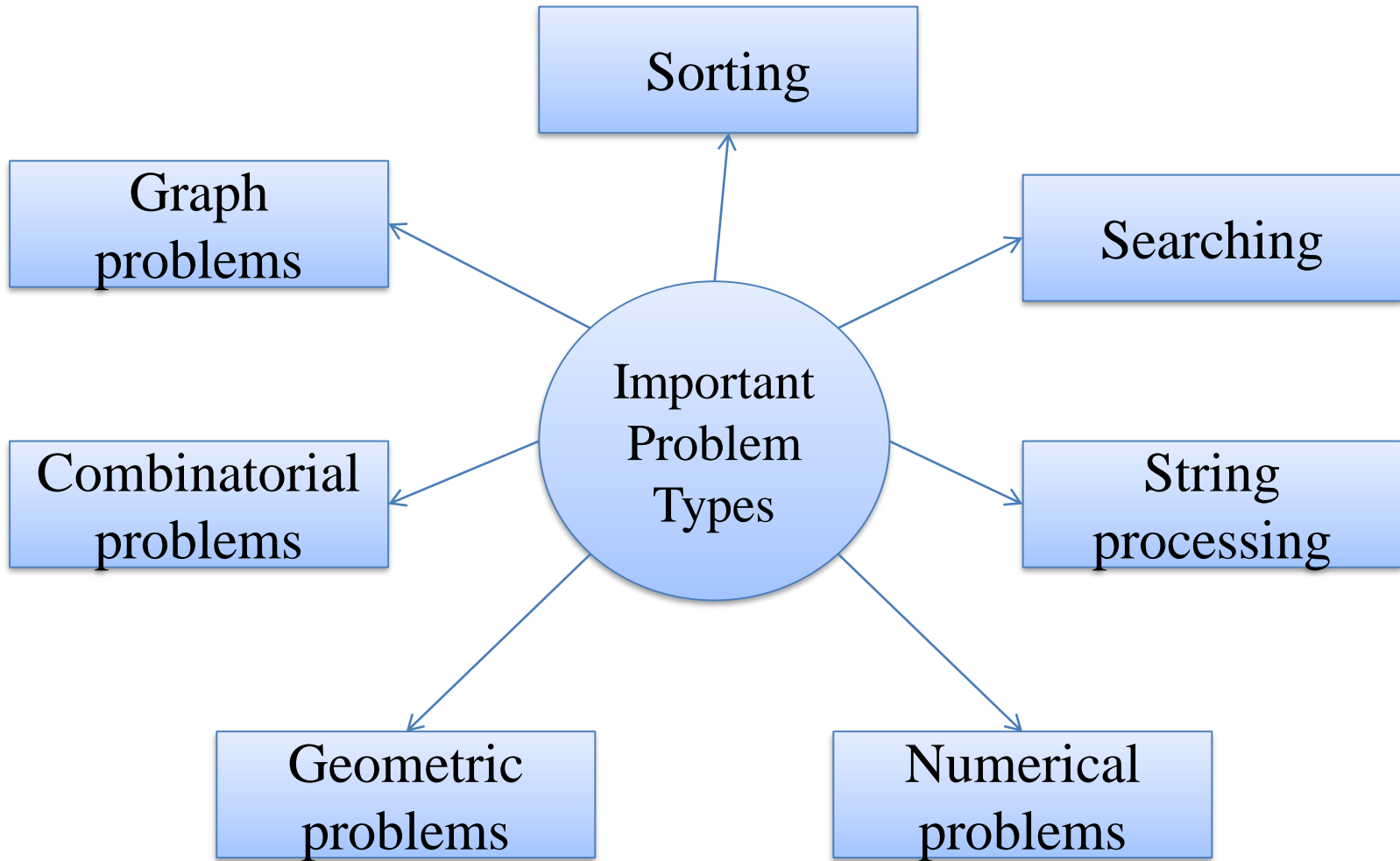


# IMPORTANT PROBLEM TYPES



# IMPORTANT PROBLEM TYPES

- *Sorting*
  - Key
  - Colleges, hospitals, office
  - Ease of search - dictionaries, telephone books, class list
  - Several algorithm – not good for all the situations
  - Searching is made easier
  - Properties of sorting algorithm
    - Stable
    - In place



# IMPORTANT PROBLEM TYPES

- **Searching**
  - Search key
  - Several algorithm
- **String processing**
  - String – string matching



• **Methods to specifying an algorithm**

- Natural language
- Pseudo code (Natural language + programming constructs)
- Flowchart

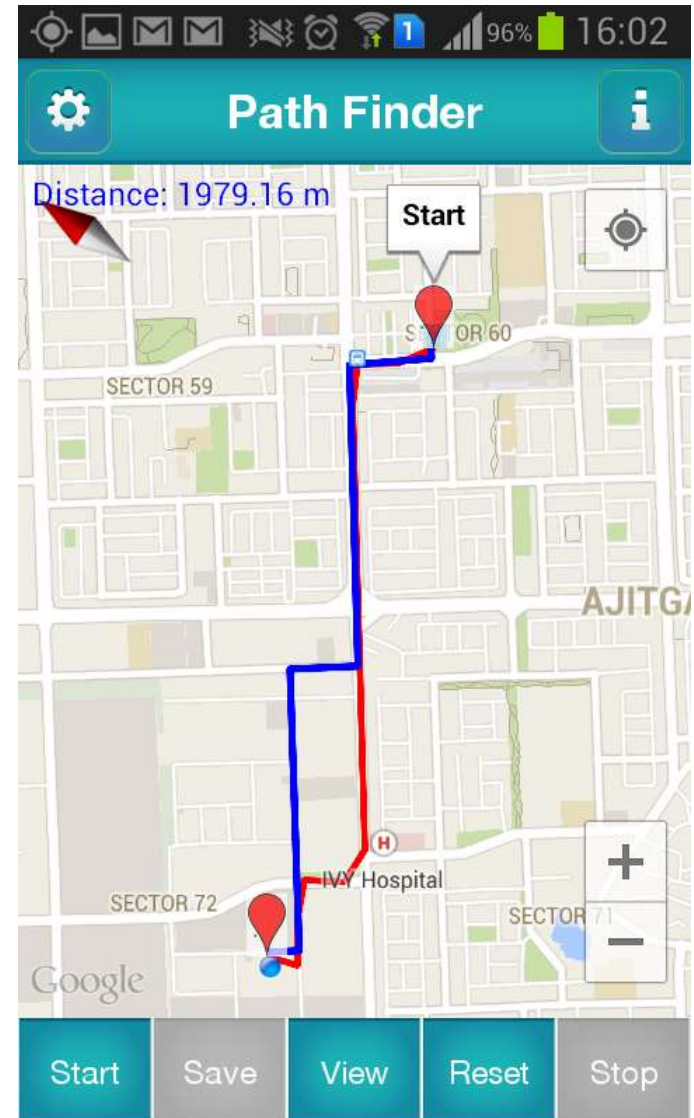
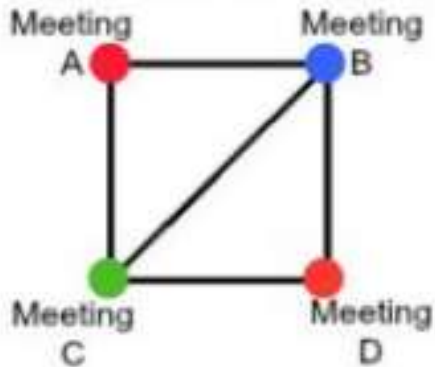
26-Jan-21 Design and Analysis of Algorithm - M. Shobana 15

A screenshot of a presentation slide. The slide content includes a bulleted list under the heading 'Methods to specifying an algorithm'. The list items are 'Natural language', 'Pseudo code (Natural language + programming constructs)', and 'Flowchart'. At the bottom of the slide, there is a footer with the date '26-Jan-21', the title 'Design and Analysis of Algorithm - M. Shobana', and the page number '15'. A 'Replace' dialog box is overlaid on the bottom right corner of the slide. The dialog box has a title bar with a question mark and a close button. It contains two text input fields: 'Find what:' with a blue plus sign and a dropdown arrow, and 'Replace with:' with an empty field and a dropdown arrow. Below these fields are three checkboxes: 'Match case' (unchecked), 'Find whole words only' (unchecked), and 'End Next' (checked). There are also buttons for 'Close', 'Replace', and 'Replace All'.

# IMPORTANT PROBLEM TYPES

- *Graph problems*

- Vertices, edges
- Graph traversal, shortest path
- Flight network, Google map – shortest path
- Ex: travelling salesman problem,
- Graph coloring – event scheduling



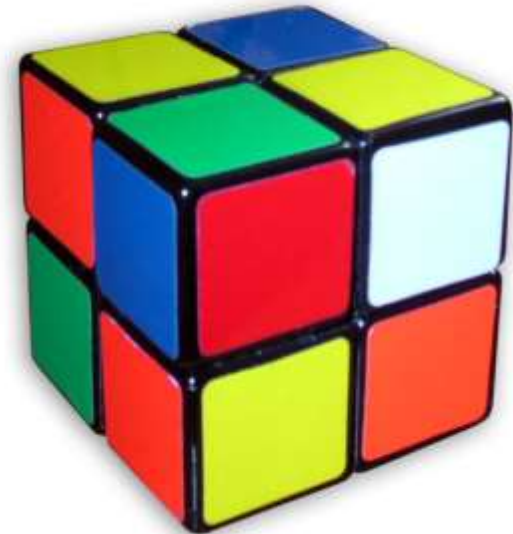
# IMPORTANT PROBLEM TYPES

- *Combinatorial problems*

- Finding optimal object from a finite set of objects (permutation, combination, subset from a finite set)

- *Example:*

- How many ways are there to make a 2-letter word
- How many ways are there to select 5 integers from  $\{1, 2, \dots, 20\}$

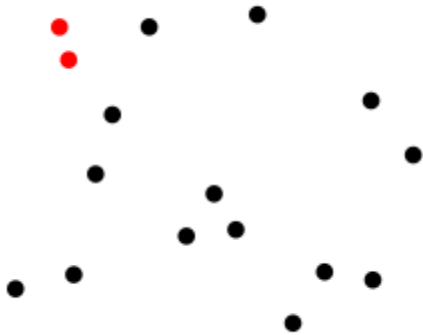


# IMPORTANT PROBLEM TYPES

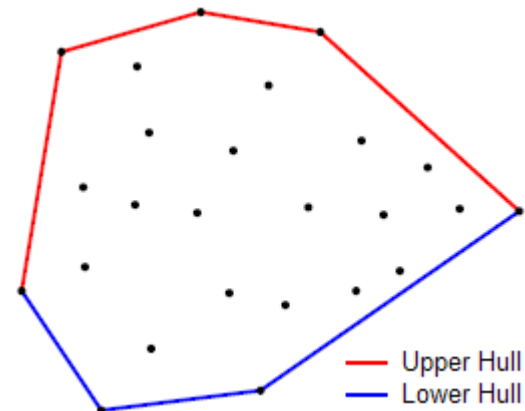
- *Geometric Problems*

- Points, lines, polygons
- Computer graphics (circle,smiley)
- Example

## *Closest pair problem*



## *Convex hull problem*



### *Real-time application*

Nuclear/chemical leak Evacuation  
Tracking Disease epidemic

# IMPORTANT PROBLEM TYPES

- *Numerical Problems*
  - Integrals, functions
  - Approximate
  - Real numbers