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Inventing Harmonious Future

Institute for Advancing Intelligence, TCG CREST
(TCG Centres for Research and Education in Science and Technology)

Design and Analysis of Algorithms

PhD Coursework, Semester-II, Session: 2023-24

Assignment-II

Maximum Marks: 10– (marks of project-I) Submission Deadline: **2023-Mar-17**

Analyzing different types of Algorithms

Conduct a comprehensive analysis of the following types of algorithms commonly used in computer science problem-solving.

- Greedy Algorithms
- Brute Force Algorithms
- Dynamic Programming Algorithms
- Divide and Conquer Algorithms

• Your analysis should focus on the characteristics, behaviors, and applications of each type of algorithm, providing detailed comparisons across various features as follows.

1. **Optimality**: Refers to the extent to which an algorithm's output meets the defined optimization criteria, aiming for the best possible solution given the constraints.
2. **Subproblem Overlap**: Indicates whether a problem-solving approach involves overlapping subproblems, where solutions to smaller subproblems are reused in the computation process to improve efficiency.
3. **Backtracking**: Describes the process of revising decisions made during problem-solving by exploring alternative choices, often used in algorithms to explore different paths and refine solutions.
4. **Memory Usage**: Represents the amount of computer memory required by an algorithm to store data structures, intermediate results, and other relevant information during computation.
5. **Time Complexity**: Measures the computational efficiency of an algorithm in terms of the amount of time required to execute it as a function of the size of the input, providing insights into its scalability and performance.
6. **Determinism**: Refers to whether an algorithm produces the same output for a given input and execution conditions every time it is executed, ensuring predictability and reproducibility of results.

• **Comparison Table**: Create a comparison table similar to the one provided below, outlining the differences and similarities between each type of algorithm across various features.

• **Analysis and Discussion**: Analyze the implications of each feature on the behavior and performance of different types of algorithms. Discuss how these features influence the suitability of each algorithm type for different problem-solving scenarios.

• **Applications**: Provide examples of real-world applications where each type of algorithm is commonly used, highlighting their effectiveness in addressing specific problem domains.

• **Conclusion**: Summarize your findings and conclusions regarding the strengths, weaknesses, and applications of each type of algorithm based on your analysis.

Submission: Please ensure that your submission is in PDF format. This will help maintain consistency in formatting and ensure that all content is preserved as intended. The header of the pdf file should contain the name of the author/authors. Submit the assignment via submission portal.