

[Home](#) [DAA](#) [DS](#) [DBMS](#) [Aptitude](#) [Selenium](#) [Kotlin](#) [C#](#) [HTML](#) [CSS](#) [JavaScript](#)

[↑ SCROLL TO TOP](#)

Approximate Algorithms

Introduction:

An Approximate Algorithm is a way of approach **NP-COMPLETENESS** for the optimization problem. This technique does not guarantee the best solution. The goal of an approximation algorithm is to come as close as possible to the optimum value in a reasonable amount of time which is at the most polynomial time. Such algorithms are called approximation algorithm or heuristic algorithm.

- For the traveling salesperson problem, the optimization problem is to find the shortest cycle, and the approximation problem is to find a short cycle.
- For the vertex cover problem, the optimization problem is to find the vertex cover with fewest vertices, and the approximation problem is to find the vertex cover with few vertices.

Performance Ratios

Suppose we work on an optimization problem where every solution carries a cost. An Approximate Algorithm returns a legal solution, but the cost of that legal solution may not be optimal.

For Example, suppose we are considering for a **minimum size vertex-cover (VC)**. An approximate algorithm returns a VC for us, but the size (cost) may not be minimized.

Another Example is we are considering for a **maximum size Independent set (IS)**. An approximate Algorithm returns an IS for us, but the size (cost) may not be maximum. Let C be the cost of the solution returned by an approximate algorithm, and C^* is the cost of the optimal solution.

We say the approximate algorithm has an approximate ratio $P(n)$ for an input size n , where

$$\max\left(\frac{C}{C^*}, \frac{C^*}{C}\right) \leq P(n)$$

Intuitively, the approximation ratio measures how bad the approximate solution is distinguished with the optimal solution. A large (small) approximation ratio measures the solution is much worse than (more or less the same as) an optimal solution.

Observe that $P(n)$ is always ≥ 1 , if the ratio does not depend on n , we may write P . Therefore, a 1-approximation algorithm gives an optimal solution. Some problems have polynomial-time approximation algorithm with small constant approximate ratios, while others have best-known polynomial time approximation algorithms whose approximate ratios grow with n .

[< Prev](#)[Next >](#)

 [For Videos Join Our Youtube Channel: Join Now](#)

Feedback

- Send your Feedback to feedback@javatpoint.com

Help Others, Please Share





Top B school in Del


Top Management College in I
NDIM Delhi

NDIMDelhi


Learn Latest Tutorials




Splunk tutorial
Splunk




SPSS tutorial
SPSS



Swagger tutorial
Swagger



T-SQL tutorial
Transact-SQL




Tumblr tutorial
Tumblr



React tutorial
ReactJS




Regex tutorial
Regex



Reinforcement learning tutorial
Reinforcement Learning



R Programming tutorial
R Programming




RxJS tutorial
RxJS




React Native tutorial
React Native




Python Design Patterns
Python Design Patterns



Python Pillow tutorial
Python Pillow



Python Turtle tutorial
Python Turtle



Keras tutorial
Keras

Preparation



Aptitude
Aptitude



Logical Reasoning
Reasoning



Verbal Ability
Verbal Ability



Interview Questions
Interview Questions



Company
Interview
Questions

Company Questions

Trending Technologies



Artificial
Intelligence

Artificial
Intelligence



AWS Tutorial
AWS



Selenium
tutorial

Selenium



Cloud
Computing

Cloud Computing



Hadoop tutorial
Hadoop



ReactJS
Tutorial

ReactJS



Data Science
Tutorial

Data Science



Angular 7
Tutorial

Angular 7



Blockchain
Tutorial

Blockchain



Git Tutorial
Git



Machine
Learning Tutorial


Machine Learning




DevOps
Tutorial

DevOps


B.Tech / MCA




DBMS tutorial
DBMS




Data Structures
tutorial
Data Structures



DAA tutorial
DAA




Operating
System
Operating System




Computer
Network tutorial
Computer Network




Compiler
Design tutorial
Compiler Design




Computer
Organization and
Architecture
Computer
Organization




Discrete
Mathematics
Tutorial
Discrete
Mathematics




Ethical Hacking
Ethical Hacking



Computer
Graphics Tutorial
Computer Graphics




Software
Engineering
Software
Engineering




html tutorial
Web Technology




Cyber Security
tutorial
Cyber Security




Automata
Tutorial
Automata



C Language
tutorial
C Programming




C++ tutorial
C++




Java tutorial
Java




.Net
Framework
tutorial
.Net



Python tutorial
Python



List of
Programs
Programs



Control
Systems tutorial
Control System



Data Mining
Tutorial
Data Mining



Data
Warehouse
Tutorial
Data Warehouse

