## Algorithm Analysis formework

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X		

( AJAY RAWAT)

$\rightarrow$	Random access machine (RAM) is a model of Computation where
political.	instructions are executed one after another with no Concurrent
	Operations.
	- RAM model Contain instructions Commonly found in real Computer
	: arithmetic (add, Subtract, muleiply, dride, remainder, floor,
	ceiling), date movement ( load, Stone, Coty) and Control
	( Conditional, on Conditional branch, Subvoutine Call and return)
	- Each instruction takes a Constant amount of line.
( last 6	Page) Heading
->	There are two kind of efficiency (complexity)
	O SPace Complexity
	- The ic has compent at mornion it used to run to Contration
and a	- It is the amount of memory it needs to run to Completion
144	ie from Start of execution to 16 termination.
	- Charle manufact to many about the compact Court to
	- Space needed by any algorithm is the Som of following Components  1) Fixed component
	this is independent of the Characteristic of
	the inputs and outputs. It includes Instruction space, Space
land Bark	of simple variables, fixed see Component variables and
	Constant Variables.
	The state of the s
	2) Nariable Component
- Te	
T V	- This Consist of the Space needed by Component variables whose Size is dependent on the particular problem instances (I/50/e)
au le	being solved, the space needed by reference variables
	and the relussion Stack Space.
	- Data Structure Components like linked list, heap, heer
-	grapus.
	Shale (A) = freed Gushmant (A) - A Valiable Constraint (A)
	Space (A) = Freed Components (A) + Valiable Components (A)

10	(2) Time Complexity
nd -	- It is the amount of Computer line it needs to rim to Completion.
-A 1	- Time Taken by a program is the Sem of the Compile
	time and the run/execution time.
1-11	- the Compile time does not depend on the instances Characteristic
met l	the the transfer that the transfer to the second the second secon
コ	upret Size
>-	one of the instance characteristics for run time complexity of on algorithm is infant size.
	of on algorithm is input Size.
•	\$100 Pt-000 100 Pt-000
_	longer input sie make algositum to sun longer time.
400	Control May 10 10 and 10 to a company to the control of the contro
7:	the input see for the problem of Summing on array With
	'n' elements is n+1 (n for listing—the 'n' elements and
4	1 for 'n' value).
→	Unit of measuring time
	THE PROPERTY OF THE PARTY OF TH
	The drawback of using line ( Seeind, miliseland) as a Standard unit.
	- Speed of Computer
	- Quality of program implementing the algorithm
	- Compiler used is generating machine code.  - Difficult in Clocking the actual running time of an algo.
2 53	- Difficult in Clocking the actual running time ext an algo.
	Minute Transport Table Control of the Control of th
-	So have to look for metric that does not depend on
	these expaneous factor.
La	A THE BUILD SHOW THE CONTRACT OF THE PARTY O

important operation (Basic operation) of

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- Basic operation is nothing but core operation, generally resides in Inner loop.

- eg in Sorting algo.

   Comparing the elements.

   Placing them in appropriate position.

## -> Worst-Case, Best Case, and Arrange Case Efficiencies

- Worst Case efficiency of an algorithm is the efficiency for worst case input of fre n

   Olgo runs the longest among all possible input of that size.

  - It provides very important information about an algorithm's efficiency by bounding its running time from above.
  - Best Case efficiency of an algorithm is its efficiency for Best Case imput of Size n.
    - Algorithm runs the fastest among all possible imputs of that size.
    - Bost Case does not mean the Smallest input, it means the input of Size in for which the algerithm runs the fastest.
    - lg for Sorting algo (already Sorted array) (from balow mean lower Bound)

      Average Case

- -> Average Case
   Take all possible inputs and Calculate Computing time for all of the limputs
  - Sim all the Gladated values and divide the Sim by

	Proge
	total no ex imprets.
	At a second seco
	- eg linear Search.
	The second secon
	- must know (predict) the mathematical distribution of all
	possible inputs. Worst Case
	possible inputs. Worst Case Complexity
	No of Complexity
	The state of the same of the state of the st
1.9	Best Case Complexity
	Complexity  1 2 3 3 ··· N
1000	N 2 3 3 N
	Graphical Representation
	Analysis of Algositum
	1- Measuring time Complexity
	2 - Measury Space Complexity
	s - reasuring input sol
34 -40	4- measuring running time.
	5 - Computing best Case, worst Case, average Case efficiency.
	6 - Computing order of growth of algorithms.
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	the transfer delicated the transfer of the last the same of the last the last the last the same of the last the
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