Depth Finst Search:	The state of the s
'	
runs on directed/undirected gr	aphs and ignoles any
meight	a) I samua belinn
me ensume an underlying adja	ncy list representation
0 0 ,	2 1 2 2 3 3 1
exploring the graph within.	1111- 12001
· V) v zat	o take the second
The May (Shorter)	+ 1 1 31 4 X
Simple Implementation	
1 × 1 × 1 × 1 × 1	
DFS (G, Startvertex).	Reset Caraph (G)
Reset Graph (G).	top yet V
DESVertex (start vertex).	v. discovered = false
VC-10 12	V N NO AST
DFS VOLPEX C	l A'
Los each V s. E u → V	VI
it (not vidiscovered)	existing A
DFS Vertex (v)	
).
socussine calls	
classive com	
south is almost shoulest possible	but not incase of DFS.
stering distance/length is also not interesting here	
clie to same reason.	
Instead use use time stamps, I	JUISH LIME WICE
disconery time to do some inte	uesting teases
0	7
	unis on directed/undirected greenight me ensume an underlying adjoint exploring the graph within. Simple Implementation DFS (Gr. startVertex). Reset Graph (Gr). DFS Vertex (startVertex). DFS Vertex (startVertex). DFS Vertex (u) Questionered = Time for each v s.t u -> v if (not v. disconered) DFS Vertex (v) Recursive calls Storing parents is less interesting path is always shortest possible ethsical distance / length is also

*	Implementation:
1.91	again deil withing the Rubbana
	Paret (Melon Och
	DFS (G, StartVertex). Middle for VEV
	Reset waph (o)
	DFSVertex (start Vertex)
	DFSVertex (start Vertex) v. finishing = -1
	. (x desire time = 1.0 ist
7.	I de tomph (a). Partonio
(R/	DFSVertex (u) .(xolos) Janda) xolos yelli
P. A.	
23/0/1	for each v s.t u >v
	if (v. disconery <0)
	VIT = U PRINT = Lanevaridad
	DESVUTEXIVO - N 1 3 V M NO 105
	u. finishing = time +towards is don'thi
	DFS Vertex (v)
	Who en 16 20 10 4 1 5 -
*	One problem here list when we apply DES
1	grant a voctor, there may be well experienced more
9 1	remain rindis confled.
1	if you mant to explore the whole grant uses
	1000 3 Mort delate equapte south son or year or
	referred and in the state of smith property

·	
	DFS (6)
	Resetbraph (h)
	for utl description de la facilità del la facilità de la facilità
Film .	if (u.disconery < 6)
	DFSVentex (U)
	it to be found in the
*	This energthing can be visualized in terms of
	balanted paranthesis where . L -> signifies when
	balanced paranthesis where . (> signifies when a DFS call is made on a nextex and) -> when the
	call exits
	A child will be nested in its parent will be
cx:	(((()))(())) (counting parantheses from
8.34	(((())(()))) the beginning will match discovery
1	and and plate in the thirty times)
*	Another approach to time stamps is common vertex holors - white (undisconered), mey (discovered.
	Vertex Robous - white (undisconered), (mey (disconered.
g. T	unfinished) and Black (finished)
*	Edge clasification:
Carles	yearled was beautiful
Ü	True Edge:
	parent to a child.
•	go to an undisconered vertex.
	tor (2100) mathew was no 210 that was -
	The second of th

(ii)	Back Edges:
1	by an animable
•	to an ancestor unfinished vertex to a discovered but unfinished removing baye edges
•	enem pacis edges makes a cycle, and some againstruction
	to a discovered but unfinished hereon every back edges makes a cycle, and removing back edges will remove all cycles. (also self loops are included).
(iii)	Forward Edges:
(111)	
	to a non-child desundant/ not a direct child!
(-5	to a finished nertex disconered after the
1.51	authent witer with the state of
	educate when
(iv)	Cross Edges: In 100 die in Litzen al Die Mille A
	Coops pages. In All and the second
(-)	any other edge can go to one branch to
in a social	another or also from one the to another till.
-	no ancestor-descendent relationship between
()	the virtices lit links.
h:-2,	to a nertex finished before the current.
	neltex's disconery.
-	
*	Undirected Graphs: will wife a black of the
	no forward / cross Edges
	Ser Part Trie
	15/10 x 0/ 40 x x x
*	Analysis:
_	me call DFS on energy nertex (once) and
	27 VIX EVEN EDGE
•	on a graph
,	on a graph taking time $\Theta(1V1+1E1)$

	on a single nectex with (= (v', E') reachable
	from that nevex, takes time $\Theta(1V1+1E'1)$
	all nutius au initialized.
	(C. Malao C
	years Just one & North 10
*	Deep Thes may cause Stack Onerflow
	Deep Trees may course Stack Overflow hence me may use our own stack implementation for DFS: ""
	implementation tak DES:
	The part of the control of the contr
	DFS (a) (E.verk) applitudent
	Resetbraph (b)
	S= new stack On 10 and a lack of the
	tor (u EV)
	S. pushcu); (2 1) xxxxxxxxx
	(0> 4 rid mil 1) 1 201°
	while (not s. is Emply ()) = locality
	X = 3, pop () : 1 1 x 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	if (x. is Vertex ()) = Javal. (very)
	Explore Vertex (x,S)
y'a.	else
	Explore Edge (x,S)

Explole Vertex (u, s) if (u. disconery <0) u. disconery = time++ S. push (u) for each v such that would sipush (u > v) species else if (u. finishing < 0) u-finishing = time++ Explose Edge (u -> v, s)

if (v. discovery < 0)

(u > v). label = "tree Edge" x ExploseVertex (v, S) else if (v.finishing <0)

(u > v). lablel = "back Gdge" close if (v. disconery) > u. disconery) (u -> v). label = "forward Edge" else (u -v). label = 2 " cross Edge"