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	EXP NO - 5 NINTINAX ALGORATHM
	AIM:
	so implement minimax algorithm using python
	ALGORITHM:
1)	create a 3×3 grid for the board filled with zeros
	for ampty could.
2)	ASSIGN HUMAN as -1 and comp as +1, and let the human
	choose x or o.
3)	Decide if human or computer gods first
4)	Dioplay the board, prompt the human for a more, validate it and update board.
5)	use the minimax algorithm to find the best more and update board
6)	of the game is won, Lost or drawn return score (+1,-10
1)	eimulate movel for oneh ampty cour, recurringly call minimax and pick bost score.
	and the property of the party of the party leading the
8)	chock for a winner for full booted do declare win !
	or draw.
9)	show the timal board and print "you win", "you cose"
	"praw" books on outcome.

	CODE: ([[E][O]OSSA,[[][O]SSAD,[O][A]SADO]
	from math import int as infinity
	from rondom import choice
	import platform
	import time
	from 0s import system
	HUMAN = -1 : COLORD TORRESTOR
	COMP = 4+11 (Stage ) 2 Tru no (Mauth , Stage ) 750 Auth
	The continue of the party of the party of the last of
	60and = [ (Cotato 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	[0,0,0],
	(o, 0, 0], (state); (state); ([0,0,0]
	[0,0,0], (Congression of the trans
	]
	Edits aggord ([+ x,y])
	dof evaluate (state):
	it wins (state, comp):
	\$ \$0010 = +1 (1+x) sum +1111 +111
	elif wino (state, HUNIAN):
	Scorro = -1
	elce:
	PLOTE = 0
	return ecore
	don set made (my peoples):
	det wins ( state, player):
	win- etate = [
	[ state (0) (0), state (0) (1), state (0) (2)]
	( ototo [1][D], state [1][1], state [1][2]],
	(otota [2](0), state [2](1), state [2](2]),
	[date [8] [0], state [1] [0], state [2] [0]],
	catata (D) (1), state (1) (1), state (2) (1)),
•	[ state (0) [2], state [1][2], state [2][2]],
	[ state (D) LD), state [1] [1), state [2] [2] ],

	[ state [2] [0], state[][1], state[0][2]],	
	J years as all terrini attor arms	
	if [ player, player, player] in win-state:	
	roturn True	
	واي :	
	return False	
1 141	crizes o and gold on the street sound again a	
	dep game-over(state):	
	return wino (State, HUMAN) or wire (state, comp)	
1 0	ACTEGOR HANDS - OF THE THIRD TO HOME THE THE TAX THE THE THE TAX	
	dot ampty-cells (state):	
	cous = [] 1[0:0:0]	
45.10	for x, now in enumanate ( state):	u_ i
	for y, cell in enumerate (1000): [0,0,0]	1 3
CF In 180	if cou == 0:	
	ceus. append ([* x,y])	1-1
	return ceye. : concers aboutous and	Ī.
	CONTRACTOR (CAMP): 4 CAMP CONTRACTOR STATE	
	det valid-move (xiy):	
	if [xiv] in empty-couls (board):	
100	return tru	
	0100 : : : : : : : : : : : : : : : : : :	
I filled	return false.	
	return score start and a second	
	det set-move (x,y, player):	
	if Evolid-mon (xiy):	
The street	board [x][y] = player	
100 1170	return True 1000 Talle T	
	eleg: A state of the state of t	
	return False	
	ित्वित (वार्ष्य) माना विवास (वार्ष्य)	
	the telephone and the policy and the control of the	_

I stole to Lat , sale 1912 , sale 1912 ].

classmate

Date

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```
det minimex (State, depth, player):
   if & player == oup:
   bost . [-1, -1, -initiality]
   else :
    600 t= [ -1, -1, + infinity]
       The of the state of the section
   for cell in empty-cells (state):
     xiy = ceu LOJ, ceu (1)
     state (x)(y) = player
     score = muhimar ( state, depth -1, -player)
     state [x][7] = 0
     score (D), score (i) = xiy
       ment (+' majator can ! (C. chaice)) !
     if play or == comp = . A strain a largety and a
     if score [2] > Lost [2]
      best = corre (cs. 1.0) sine = x
    12 chaice ([0, 11, 27) : 2019
    if econe (2) < bost (2):
      book a score in the sometime a store
    roturn bost (1) soon on storm = 10
                    (spurp + 1x ) week to
det clean ():
  08-name = platform-system (). Lawore
  if 'windows' in op-name:
   system ('cls') (throat also years as a sant
  else: Chesang and man a consent
   syptem ('dear')
det rorder (state, c-choic, h-choice):
  Thana = 2
     -1: h-choice;
      +1: C. choice, Lang it constitution in the
      0:11
```

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etr_une = ' --- - '
   print ('in' + str-line)
   for now in state:
     for cou in row:
        symbol = charr (col)7
       print (t' 1 ssymbol 3 1', and = ")
   print ('In' + str-line)
det ai-turn (c-choice, h-choice):
  depth == 0 or game-over (600 mol):
   return
 cloan ()
 print (f' computer turn [ {c-choicey]')
 rander abound, a-choice, h-choice)
 it depth == 9:
  X = choice ([0,1,2])
  Y = choice ([0,1,2])
  else;
   move = minimax (board, depth, comp)
   XIY = move [0], move [1]
   sot-more (XIY, comp)
  time - sleep (1)
def human-turn (c-chaice, h-chaice):
  dopth = (on (ompty-cells (board))
   if dopth == 0 or gome-over (Loand):
   cotum
  move = -1
  mers = 8
    1: [0,0], 2:[0,1), 8: [0,2],
    4: [40] , 5: [4] , 6: [42] ,
   7: [2:0], 81 [2:1], 9: [2:2],
```

```
cloon ()
  print (f 'Human turn [ { fh-choice 37')
  rarder (board, c-choice, h-choice)
  while move <1 or move 79:
  thy and a child a more of many from some
     move = int (input ('use numped (1.9):())
     coord = moves [mone]
     can-move = set-move (coord (D), woord (i), HUMAN)
     if not con-move:
      print (' Bad mour') delicate has the trace
       moul = -1
except (EOFERROR, leayboard Interrupt):
      Print ('Byo') : " !! == 12 == +1
      exit () (osmand, osmand) committee
    except (key Emor, whitemor):
       paint ('Bod chaice'):
det main ():
                    in cold cared, related)
   cloan ()
  h-choice = "
   C-doice = " ( ) a same A? ] and partner 'd) with
   first = 11 (greats - 2 mater & known) rates
   while h-choice != o' and h-choico != x'
                 Marca I, Dical ) me
      try:
       h-charice = input ( chaose x or o in charan : 17. upper ()
      except (EDFETMON, veryboard Entermupt):
       paint ('bye') and a saine trucks were
        exit ()
      except ( key Error, volue Error):
        print (1800) choice')
      the h-choice == 'x',
        c. chaice: 'D'
```

```
else: c-choice = x'
     (loan()
    while first!=y' and first!='N':
      try :
        times input ('First to start ? [YIN] : :) · upp Or ()
      except (EDFERROR, wayboard Intocrupt):
         print ('Bye')
      exit ()
      except ( keyEstor, volus Error):
         print ('Bed choice')
  while lon (empty-collectooled))>0 and not gone-ever closerd):
     it tirst == 'N':
       ai-hum (c'-choice, h-choice)
      tiss = ' '
     human hum (C-chaice, h-chaice)
     ai-turn (c-charce, h-charce)
   it wins (board, HUNAN) -
     print (b' Human from [ & h-chaica 3]')
      ronder (boord (c-charce, h-charce)
     print ('you win!')
  elit wing closed, comp?:
     doon()
     print (f' computer turn [ &C-choice 37')
     render closed, choice, h-choice).
    print ( you lose ! )
   alse:
     deen ()
     ronder ( board ( c. chaice, h-chaice)
     print ( 'prowit')
it - nome = 1 - main - 1;
    main ()
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	OUTPUT:			
	Choose X or O Chosen: x			
	First to start? [y/n]: Human turn [X]	у	Human turn [X]	
101	(a) 1   1   1   1	ne gener en		
	1 11 11 1		10      X	* 040s
	1 11 11 1		x    x    o	
	Use numpad (19): 4 Computer turn [0]		0   1   1	
			Use numpad (19): 2 Computer turn [0]	r personala.
- 6	THE HE	lmon plinon		10 9000 0
	1 × 11 11 1	24	0    x    x	510 1000
	1 11 11 1		x    x    o	
	Human turn [X]		1011 11 1	The second second
	1011111	พอบ วรุ่งลอสสัย	Human turn [X]	in Alberta (c
	×			
	1 11 11 1	identify me	0    x    x	S croton &
	Human turn [X]	U.S.	x    x    o	algorithm to the
	1 0 11 11 9 1		1011011 1	
			Use numpad (19): 9	
1 1 1 1	x    x    o	enet pittoch		2 after 52 fb
	0		0    x    x	
	Use numpad (19): 2 Computer turn [0]	mark man and	x    x    o	a sparry (e
100	100	the challenge	0    0    X	05 0 +3
			DRAW!	
	x    x    0			
	1011 11 1	y Chadren	a alia nomenia	know a than to
1244	Human turn [X]			-horbog 73
				1 - 3- TO
2.00	x    x    o	in perhots	on other man	tool o store (r
	1011011	107 1000 E	de son una	tou Camar
		43.0	1 110 303	50 0 910 m (3
	es città cierca	Paris Istano		S carety o gas
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