Python Project: Tetris

Project Name: Tetris
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<u>Code:</u>

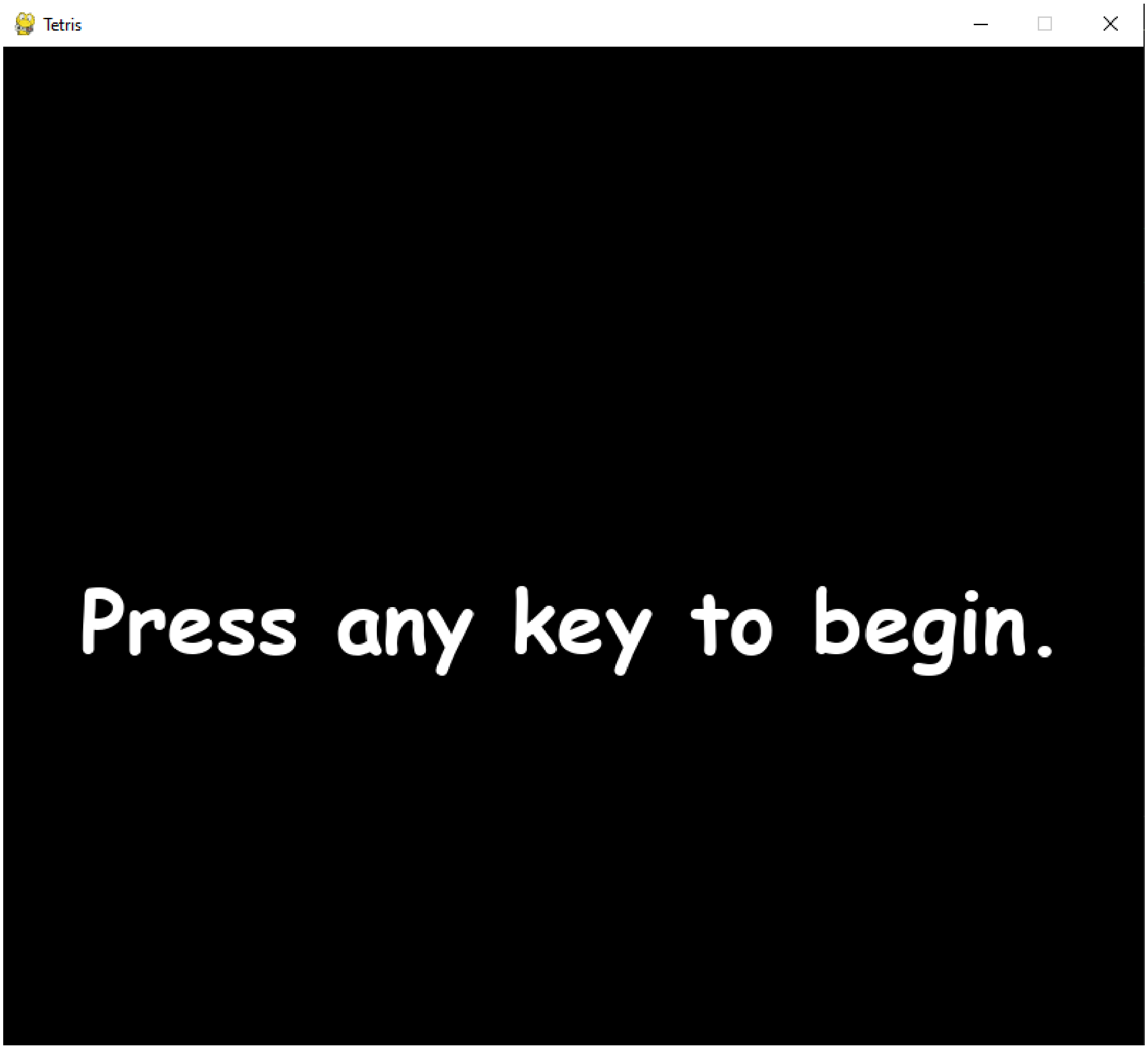
```
import pygame
import random
import time
from datetime import datetime
"""
10 x 20 square grid
shapes: S, Z, I, O, J, L, T
represented in order by 0 - 6
"""

# initialise pygame with fonts
pygame.font.init()

# GLOBALS VARS
s_width = 800
s_height = 700
play_width = 300  # meaning 300 // 10 = 30 width per block
play_height = 600  # meaning 600 // 20 = 20 height per blo ck
block_size = 30

top_left_x = (s_width - play_width) // 2
top_left_y = s_height - play_height


# SHAPE FORMATS

S = [['.....',
      '.....',
      '..00.',
      '.00..',
      '.....'],
     ['.....',
      '..0..',
      '..00.',
      '...0.',
      '.....']]

Z = [['.....',
      '.....',
      '.00..',
      '..00.',
      '.....'],
     ['.....',
      '..0..',
      '.00..',
      '.0...',
      '.....']]

I = [['..0..',
      '..0..',
      '..0..',
      '..0..',
      '.....'],
     ['.....',
      '0000.',
      '.....',
      '.....',
      '.....']]

O = [['.....',
      '.....',
      '.00..',
      '.00..',
      '.....']]

J = [['.....',
      '.0...',
      '.000.',
      '.....',
      '.....'],
     ['.....',
      '..00.',
      '..0..',
      '..0..',
      '.....'],
     ['.....',
      '.....',
      '.000.',
      '...0.',
      '.....'],
     ['.....',
      '..0..',
      '..0..',
      '.00..',
      '.....']]

L = [['.....',
      '...0.',
      '.000.',
      '.....',
      '.....'],
     ['.....',
      '..0..',
      '..0..',
      '..00.',
      '.....'],
     ['.....',
      '.....',
      '.000.',
      '.0...',
      '.....'],
     ['.....',
      '.00..',
      '..0..',
      '..0..',
      '.....']]

T = [['.....',
      '..0..',
      '.000.',
      '.....',
      '.....'],
     ['.....',
      '..0..',
      '..00.',
      '..0..',
      '.....'],
     ['.....',
      '.....',
      '.000.',
      '..0..',
      '.....'],
     ['.....',
      '..0..',
      '.00..',
      '..0..',
      '.....']]

shapes = [S, Z, I, O, J, L, T]
shape_colors = [(0, 255, 0), (255, 0, 0), (0, 255, 255), (255, 255, 0), (255, 165, 0), (0, 0,
255), (128, 0, 128)]
# index 0 - 6 represent shape


class Piece(object):
    rows = 20  # y
    columns = 10  # x

    def __init__(self, column, row, shape):
        self.x = column
        self.y = row
        self.shape = shape
        self.color = shape_colors[shapes.index(shape)]
        self.rotation = 0  # number from 0-3


def create_grid(locked_positions={}):
    #create the main game grid
    grid = [[(0,0,0) for x in range(10)] for x in range(20)] #each cell is represented by a 0

    for i in range(len(grid)):
        for j in range(len(grid[i])):
            if (j,i) in locked_positions:
                c = locked_positions[(j,i)]
                grid[i][j] = c
    return grid


#return the position on the grid where the shape must be drawn by pygame
```

```
def convert_shape_format(shape):
    positions = []
    format = shape.shape[shape.rotation % len(shape.shape)]

    for i, line in enumerate(format):
        row = list(line)
        for j, column in enumerate(row):
            if column == '0':
                positions.append((shape.x + j, shape.y + i))

    for i, pos in enumerate(positions):
        positions[i] = (pos[0] - 2, pos[1] - 4)

    return positions

#checks weather a given block has reached solid surface
def valid_space(shape, grid):
    accepted_positions = [[(j, i) for j in range(10) if grid[i][j] == (0,0,0)] for i in range(20)]
    accepted_positions = [j for sub in accepted_positions for j in sub]
    formatted = convert_shape_format(shape)

    for pos in formatted:
        if pos not in accepted_positions:
            if pos[1] > -1:
                return False

    return True


def check_lost(positions):
    for pos in positions:
        x, y = pos
        if y < 1:
            return True
    return False


#create a random shape
def get_shape():
    global shapes, shape_colors
    return Piece(5, 0, random.choice(shapes))


def draw_text_middle(text, size, color, surface):
    font = pygame.font.SysFont('comicsans', size, bold=True)
    label = font.render(text, 1, color)

    surface.blit(label, (top_left_x + play_width/2 - (label.get_width() / 2), top_left_y +
play_height/2 - label.get_height()/2))

#blit the root level grid on the surface
def draw_grid(surface, row, col):
    sx = top_left_x
    sy = top_left_y
    for i in range(row):
        pygame.draw.line(surface, (128,128,128), (sx, sy+ i*30), (sx + play_width, sy + i *
30))  # horizontal lines
        for j in range(col):
            pygame.draw.line(surface, (128,128,128), (sx + j * 30, sy), (sx + j * 30, sy +
play_height))  # vertical lines



def clear_rows(grid, locked):
    # need to see if row is clear the shift every other row above down one

    inc = 0
    for i in range(len(grid)-1,-1,-1):
        row = grid[i]
        if (0, 0, 0) not in row:
            inc += 1
            # add positions to remove from locked
            ind = i
            for j in range(len(row)):
                try:
                    del locked[(j, i)]
                except:
                    continue
    if inc > 0:
        for key in sorted(list(locked), key=lambda x: x[1])[::-1]:
            x, y = key
            if y < ind:
                newKey = (x, y + inc)
                locked[newKey] = locked.pop(key)

#update the `NEXT` column
def draw_next_shape(shape, surface):
    font = pygame.font.SysFont('comicsans', 30)
    label = font.render('Next Shape', 1, (255,255,255))

    sx = top_left_x + play_width + 50
    sy = top_left_y + play_height/2 - 100
    format = shape.shape[shape.rotation % len(shape.shape)]

    for i, line in enumerate(format):
        row = list(line)
        for j, column in enumerate(row):
            if column == '0':
                pygame.draw.rect(surface, shape.color, (sx + j*30, sy + i*30, 30, 30), 0)

    surface.blit(label, (sx + 10, sy- 30))

#get the previous high score from REGISTER
def get_high_score():
    high_score = 0
    register = open("REGISTER", "a+").readlines()
    for registry in register:
        high_score = max(high_score, float(registry.split(" ")[-2])*100)
    return int(high_score)

#draw the main window
def draw_window(surface):
    surface.fill((0,0,0))
    # Tetris Title
    font = pygame.font.SysFont('comicsans', 60)
    label = font.render('TETRIS', 1, (255,255,255))
    font = pygame.font.SysFont('comicsans', 30)
    high_score = get_high_score()
    high_score_label = font.render('HIGH SCORE', 1, (255,255,255))
    player_score_label = font.render('SCORE', 1, (255,255,255))
    high_score_label_value = font.render(str(high_score), 1, (255,255,255))
    surface.blit(label, (top_left_x + play_width / 2 - (label.get_width() / 2), 30))
    surface.blit(high_score_label, (30, 60))
    surface.blit(player_score_label, (30, 150))
    surface.blit(high_score_label_value, (30, 90))
    for i in range(len(grid)):
        for j in range(len(grid[i])):
            pygame.draw.rect(surface, grid[i][j], (top_left_x + j* 30, top_left_y + i * 30, 30,
30), 0)

    # draw grid and border
    draw_grid(surface, 20, 10)
    pygame.draw.rect(surface, (255, 0, 0), (top_left_x, top_left_y, play_width,
play_height), 5)
    # pygame.display.update()

#update the score each second
def update_score(_begin, surface):
    font = pygame.font.SysFont('comicsans', 30)
    score = font.render(str(round(time.time()-_begin)*100), 1, (255,255,255))
    surface.blit(score, (30, 180))

def main():
    global grid

    locked_positions = {}  # (x,y):(255,0,0)
    grid = create_grid(locked_positions)

    change_piece = False
    run = True
    current_piece = get_shape()
    next_piece = get_shape()
    clock = pygame.time.Clock()
    fall_time = 0
    _begin = time.time()
    while run:
        fall_speed = 0.27

        grid = create_grid(locked_positions)
        fall_time += clock.get_rawtime()
        clock.tick()

        # PIECE FALLING CODE
        if fall_time/1000 >= fall_speed:
            fall_time = 0
            current_piece.y += 1
            if not (valid_space(current_piece, grid)) and current_piece.y > 0:
                current_piece.y -= 1
                change_piece = True

        for event in pygame.event.get():
            if event.type == pygame.QUIT:
                run = False
                update_registry(_begin)
                pygame.display.quit()
                quit()
                pygame.quit()

            if event.type == pygame.KEYDOWN:
                if event.key == pygame.K_LEFT:
                    current_piece.x -= 1
                    if not valid_space(current_piece, grid):
                        current_piece.x += 1

                elif event.key == pygame.K_RIGHT:
                    current_piece.x += 1
                    if not valid_space(current_piece, grid):
                        current_piece.x -= 1
                elif event.key == pygame.K_UP:
                    # rotate shape
                    current_piece.rotation = current_piece.rotation + 1 %
len(current_piece.shape)
                    if not valid_space(current_piece, grid):
                        current_piece.rotation = current_piece.rotation - 1 %
len(current_piece.shape)

                if event.key == pygame.K_DOWN:
                    # move shape down
                    current_piece.y += 1
                    if not valid_space(current_piece, grid):
```

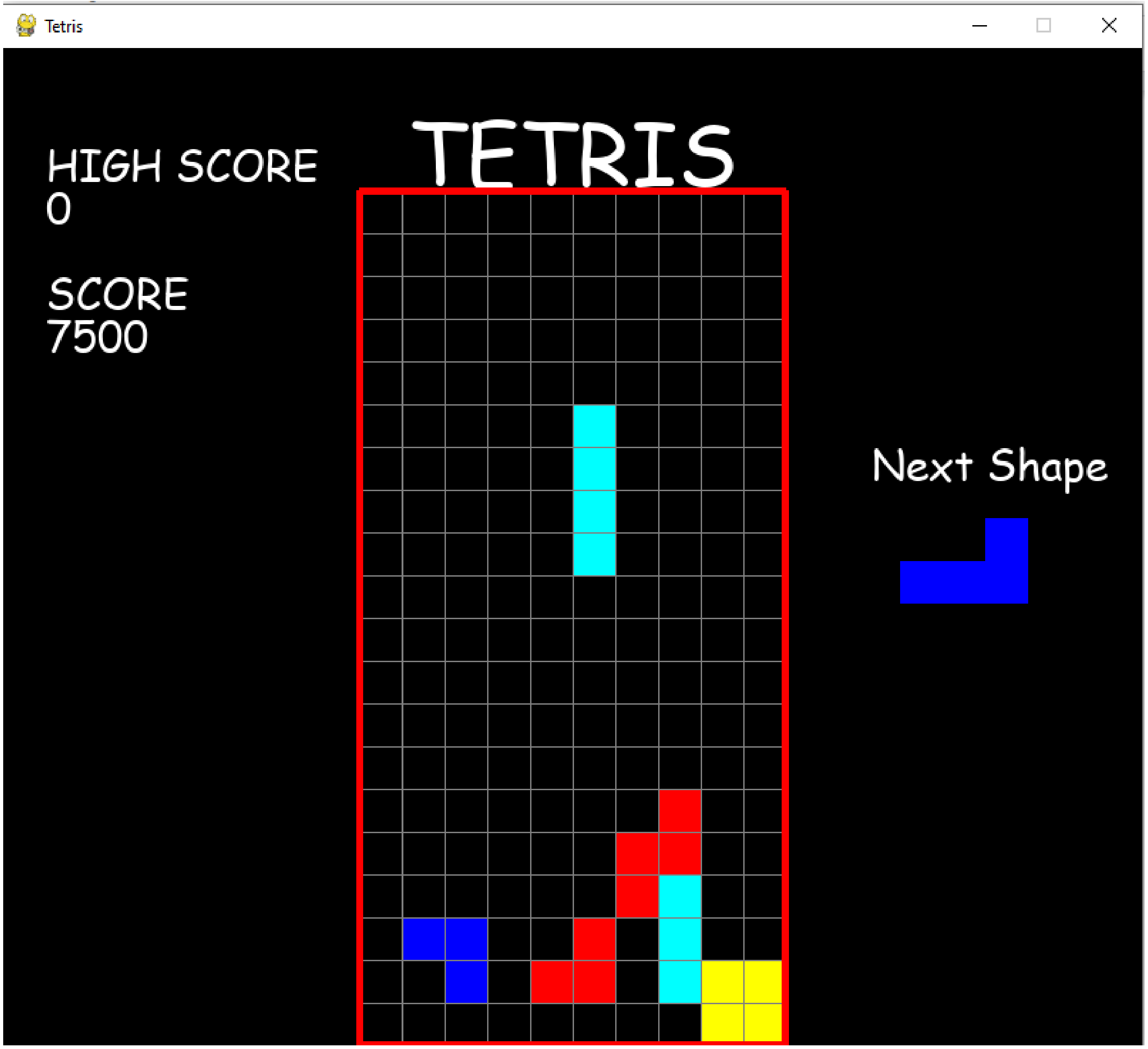
```
                    current_piece.y -= 1

            '''if event.key == pygame.K_SPACE:
                while valid_space(current_piece, grid):
                    current_piece.y += 1
                current_piece.y -= 1
                print(convert_shape_format(current_piece))'''  # todo fix

    shape_pos = convert_shape_format(current_piece)

    # add piece to the grid for drawing
    for i in range(len(shape_pos)):
        x, y = shape_pos[i]
        if y > -1:
            grid[y][x] = current_piece.color

    # IF PIECE HIT GROUND
    if change_piece:
        for pos in shape_pos:
            p = (pos[0], pos[1])
            locked_positions[p] = current_piece.color
        current_piece = next_piece
        next_piece = get_shape()
        change_piece = False

        # call four times to check for multiple clear rows
        clear_rows(grid, locked_positions)

    draw_window(win)
    draw_next_shape(next_piece, win)
    update_score(_begin, win)
    pygame.display.update()

    # Check if user lost
    if check_lost(locked_positions):
        run = False
        update_registry(_begin)

draw_text_middle("You Lost", 40, (255,255,255), win)
pygame.display.update()
```

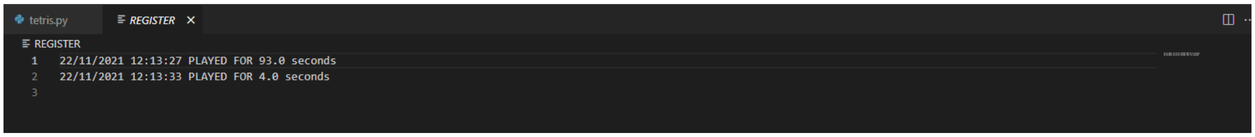
```
    pygame.time.delay(2000)

def update_registry(time_start):
    date_time = datetime.now().strftime("%d/%m/%Y %H:%M:%S")
    print(date_time)
    with open("REGISTER", "a") as _r:
        _r.write(f"{date_time}\tPLAYED FOR {round(time.time()-time_start,0)} seconds\n")
        _r.close()

def main_menu():
    run = True
    while run:
        win.fill((0,0,0))
        draw_text_middle('Press any key to begin.', 60, (255, 255, 255), win)
        pygame.display.update()
        for event in pygame.event.get():
            if event.type == pygame.QUIT:
                run = False
            if event.type == pygame.KEYDOWN:
                main()
    pygame.quit()


win = pygame.display.set_mode((s_width, s_height))
pygame.display.set_caption('Tetris')

if __name__ == "__main__":
    main_menu()     # start game
```

Output:



Press any key to begin.





```
22/11/2021 12:13:27 PLAYED FOR 93.0 seconds
22/11/2021 12:13:33 PLAYED FOR 4.0 seconds
```