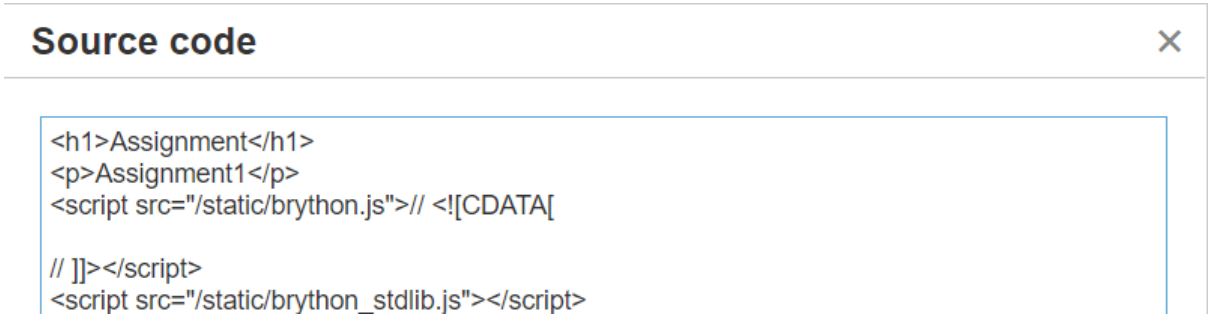
Tetris 線上遊戲專案報告

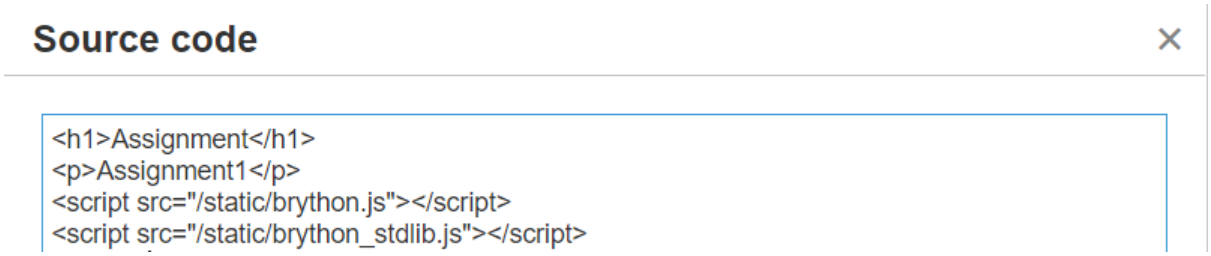
進去自己的 cms 近端網站網頁，打開 Source code 進行 Brython 配置

並將 Tetris 小遊戲導入個人網頁中

1.導入 Brython 的程式庫



可將 CDATA 註解拿掉，如下圖



2.啟動 Brython

一樣可將 CDATA 的註解拿掉，brython 的 debug 和路徑目前用不掉也可先拿掉

Source code

```
<h1>Assignment</h1>
<p>Assignment1</p>
<script src="/static/brython.js">
<script src="/static/brython_stdlib.js"></script>
<script>window.onload=function(){brython();}</script>
```

4.導入 tetris python 程式(這裡使用 SciTE 文字編輯器較好編輯)

(Untitled) * SciTE

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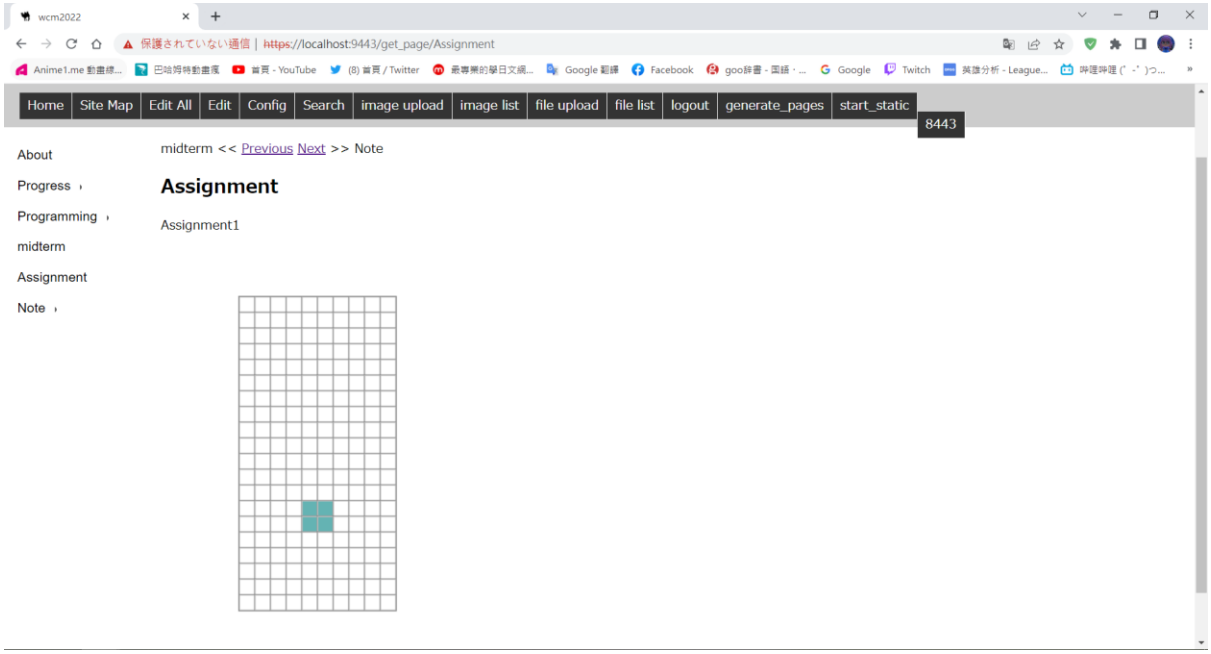
1 Untitled *

```
1   <h1>Assignment</h1>
2   <p>Assignment1</p>
3   <script src="/static/brython.js"></script>
4   <script src="/static/brython_stdlib.js"></script>
5   <script>// <![CDATA[
6   window.onload=function(){brython();}
7   // ]]></script>
8   <script type="text/python3">// <![CDATA[
9   # from https://levelup.gitconnected.com/writing-tetris-in-python-2a16bddb5318
10  # 暫時關閉 system proxy 設定後，pip install pygame
11  #import pygame
12  import random
13  # 以下為 Brython 新增
14  from browser import document as doc
15  from browser import html
16  import browser.timer
17
18  # 利用 html 建立一個 CANVAS 標註物件, 與變數 canvas 對應
19  canvas = html.CANVAS(width = 400, height = 500, id="canvas")
20  brython_div = doc["brython_div"]
21  brython_div <= canvas
22  ctx = canvas.getContext("2d")
23
24  colors = [
25      (0, 0, 0),
26      (120, 37, 179),
27      (100, 179, 179),
28      (80, 34, 22),
29      (80, 134, 22),
30      (180, 34, 22),
31      (180, 34, 122),
32  ]
33
34
35  class Figure:
36      x = 0
37      y = 0
38
39      figures = [
40          [[1, 5, 9, 13], [4, 5, 6, 7]],
41          [[4, 5, 9, 10], [2, 6, 5, 9]],
42          [[6, 7, 9, 10], [1, 5, 6, 10]],
43          [[1, 2, 5, 9], [0, 4, 5, 6], [1, 5, 9, 8], [4, 5, 6, 10]],
```

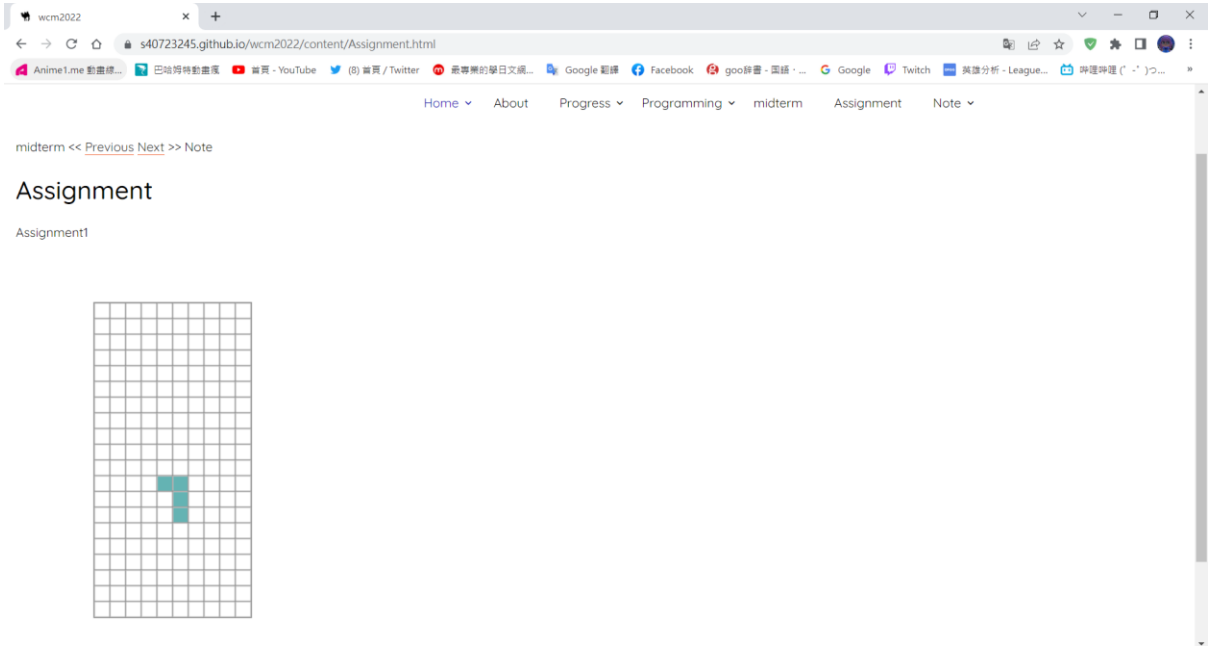
5.導入 brython_div

```
250    <div id="brython_div"></div>
```

配置完成，儲存起來即可在近端網頁上呈現



遠端網頁



5. Tetris 程式說明

程式放在 gist 底下：_

https://gist.githubusercontent.com/s40723245/9a2abb77c3e7b064d400399b5852503f/raw/a4a733155806a77d9612647d5cbbd806c03fe92e/pygame_to_brython_tetris.py

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1 Tetris.py

```
1   # from https://levelup.gitconnected.com/writing-tetris-in-python-2a16bddb5318
2   # 暫時關閉 system proxy 設定後, pip install pygame
3   #import pygame
4   import random # 導入 random 模組
5   # 以下為 Brython 新增
6   # 從 Brython程式庫中的 browser 模組 導入document 簡寫為 doc
7   from browser import document as doc
8   # 從 browser 導入 html 類別, 主要用於建立 CANVAS 標註物件, 並插入頁面中
9   from browser import html
10  # 導入 browser.timer , 用於定時執行特定函數
11  import browser.timer
12
13  # 利用 html 建立一個 CANVAS 標註物件, 與變數 canvas 對應, 並設定畫布的長寬
14  canvas = html.CANVAS(width = 400, height = 500, id="canvas")
15
16  # 將 document 中 id 為 "brython_div" 的標註, 設為與 brython_div 變數對應
17  brython_div = doc["brython_div"]
18  # 將 canvas 標註放入 brython_div 所在位置, 頁面中原本就已經放入 <div id = "brython_div"> 標註
19  brython_div <= canvas
20  # 將canvas 的 2d 繪圖 context 命名為 c
21  ctx = canvas.getContext("2d")tx
22
23  # 設定RGB, 7種方塊的顏色
24  colors = [
25      (0, 0, 0),
26      (120, 37, 179),
27      (100, 179, 179),
28      (80, 34, 22),
29      (80, 134, 22),
30      (180, 34, 22),
31      (180, 34, 122),
32  ]
33
34  # 新增 Figure 類別, 7種方塊旋轉後的各種狀態, 宣告x、y為0
35  class Figure:
36      x = 0
37      y = 0
38
39      figures = [
40          [[1, 5, 9, 13], [4, 5, 6, 7]],
41          [[4, 5, 9, 10], [2, 6, 5, 9]],
42          [[6, 7, 9, 10], [1, 5, 6, 10]],
43          [[1, 2, 5, 9], [0, 4, 5, 6], [1, 5, 9, 8], [4, 5, 6, 10]],
44          [[1, 2, 6, 10], [5, 6, 7, 9], [2, 6, 10, 11], [3, 5, 6, 7]],
45          [[1, 4, 5, 6], [1, 4, 5, 9], [4, 5, 6, 9], [1, 5, 6, 9]],
46          [[1, 2, 5, 6]],
47      ]
48
```

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1 Tetris.py

```
49      # 定義 __init__ 的功能，隨機選擇一種類型和一種顏色
50      def __init__(self, x, y):
51          self.x = x
52          self.y = y
53          self.type = random.randint(0, len(self.figures) - 1)
54          self.color = random.randint(1, len(colors) - 1)
55          self.rotation = 0
56
57      # 定義亂數產生的方塊顏色及旋轉
58      def image(self):
59          return self.figures[self.type][self.rotation]
60
61      # 定義方塊做順時針旋轉
62      def rotate(self):
63          self.rotation = (self.rotation + 1) % len(self.figures[self.type])
64
65      # 定義方塊做逆時針旋轉
66      def rotate1(self):
67          self.rotation = (self.rotation - 1) % len(self.figures[self.type])
68
69  # 新增 Tetris 類別，初始化遊戲裡的一些變數
70  class Tetris:
71      level = 2
72      score = 0
73      state = "start"
74      field = []
75      height = 0
76      width = 0
77      x = 100
78      y = 60
79      zoom = 20
80      figure = None
81
82      # 定義 __init__ 的功能
83      def __init__(self, height, width):
84          self.height = height
85          self.width = width
86          self.field = []
87          self.score = 0
88          self.state = "start"
89          for i in range(height):
90              new_line = []
91              for j in range(width):
92                  # 起始時每一個都填入 0
93                  new_line.append(0)
94              self.field.append(new_line)
95
```

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1 Tetris.py

```
96      # 新增方塊並放在(3, 0)的位置
97      def new_figure(self):
98          self.figure = Figure(3, 0)
99
100     # 檢查當前正在下降的方塊是否與在場地上的方塊交錯
101     def intersects(self):
102         intersection = False
103         for i in range(4):
104             for j in range(4):
105                 if i * 4 + j in self.figure.image():
106                     # block 到達底部, 左右兩邊界, 或該座標有其他 block
107                     if i + self.figure.y > self.height - 1 or \
108                             j + self.figure.x > self.width - 1 or \
109                             j + self.figure.x < 0 or \
110                             self.field[i + self.figure.y][j + self.figure.x] > 0:
111                         intersection = True
112         return intersection
113
114     # 如果有完整的水平線則消除掉
115     def break_lines(self):
116         lines = 0
117         for i in range(1, self.height):
118             zeros = 0
119             for j in range(self.width):
120                 if self.field[i][j] == 0:
121                     zeros += 1
122             if zeros == 0:
123                 lines += 1
124                 for i1 in range(i, 1, -1):
125                     for j in range(self.width):
126                         self.field[i1][j] = self.field[i1 - 1][j]
127         self.score += lines ** 2
128
129     # 定義方塊直接下降到最底下
130     def go_space(self):
131         while not self.intersects():
132             self.figure.y += 1
133         self.figure.y -= 1
134         self.freeze()
135
136     # 定義方塊向下移動
137     def go_down(self):
138         self.figure.y += 1
139         if self.intersects():
140             self.figure.y -= 1
141             self.freeze()
142
```

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```
143     # 判斷方塊是否與場地上的方塊交錯，如果是，則遊戲結束
144     def freeze(self):
145         for i in range(4):
146             for j in range(4):
147                 if i * 4 + j in self.figure.image():
148                     self.field[i + self.figure.y][j + self.figure.x] = self.figure.color
149         self.break_lines()
150         self.new_figure()
151         if self.intersects():
152             self.state = "gameover"
153 
154     # 定義方塊向左右移動的函式
155     def go_side(self, dx):
156         old_x = self.figure.x
157         self.figure.x += dx
158         if self.intersects():
159             self.figure.x = old_x
160 
161     # 定義方塊向逆時針旋轉的函式
162     def rotate(self):
163         old_rotation = self.figure.rotation
164         self.figure.rotate()
165         if self.intersects():
166             self.figure.rotation = old_rotation
167 
168     # 定義方塊向順時針旋轉的函式
169     def rotate1(self):
170         old_rotation = self.figure.rotation
171         self.figure.rotate1()
172         if self.intersects():
173             self.figure.rotation = old_rotation
174 
175 # Define some colors
176 # from https://stackoverflow.com/questions/3380726/converting-a-rgb-color-tu
177 # 宣告紅白灰的RGB值
178 BLACK = '#%02x%02x%02x' % (0, 0, 0)
179 WHITE = '#%02x%02x%02x' % (255, 255, 255)
180 GRAY = '#%02x%02x%02x' % (128, 128, 128)
181 
182 done = False
183 fps = 60
184 game = Tetris(20, 10)
185 counter = 0
186 
187 pressing_down = False
188 
```

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1 Tetris.py

```
189     # 定義按鍵設定
190   - def key_down(eve):
191         key = eve.keyCode
192         #if event.type == pygame.QUIT:
193         # 32 is pause
194   -     if key == 32:
195             done = True
196         # 88 is x key to clockwise rotate
197   -     if key == 88:
198             game.rotate1()
199         # 90 is z key to anticlockwise rotate
200   -     if key == 90:
201             game.rotate()
202         # 67 is c key to drop -1 on the y-axis
203   -     if key == 67:
204             game.go_down()
205         # 40 is down key
206   -     if key == 40:
207             pressing_down = True
208         # 37 is left key
209   -     if key == 37:
210             game.go_side(-1)
211         # 39 is right key
212   -     if key == 39:
213             game.go_side(1)
214         # 32 is space key to move block to bottom
215   -     if key == 32:
216             game.go_space()
217         # 27 is escape
218         # reset the game
219   -     if key == 27:
220             game.__init__(20, 10)
221
222   - def key_up(eve):
223         key = eve.keyCode
224         # 40 is down key
225   -     if key == 40:
226             pressing_down = False
227
```

```
#while not done:
# 定義開始遊戲後的設定
def do_game():
    global counter
    if game.figure is None:
        game.new_figure()
    counter += 1
    if counter > 100000:
        counter = 0
    if counter % (fps // game.level // 2) == 0 or pressing_down:
        if game.state == "start":
            game.go_down()
    for i in range(game.height):
        for j in range(game.width):
            ctx.fillStyle = WHITE
            #ctx.scale(game.zoom, game.zoom)
            ctx.fillRect(game.x + game.zoom * j, game.y + game.zoom * i, game.zoom, game.zoom)
            if game.field[i][j] > 0:
                ctx.fillStyle = '#%02x%02x%02x' % colors[game.field[i][j]]
                ctx.fillRect(game.x + game.zoom * j + 1, game.y + game.zoom * i + 1, game.zoom - 2, game.zoom - 1)
            ctx.lineWidth = 1
            ctx.strokeStyle = GRAY
            ctx.beginPath()
            ctx.rect(game.x + game.zoom * j, game.y + game.zoom * i, game.zoom, game.zoom)
            ctx.stroke()
    if game.figure is not None:
        for i in range(4):
            for j in range(4):
                p = i * 4 + j
                if p in game.figure.image():
                    ctx.fillStyle = '#%02x%02x%02x' % colors[game.figure.color]
                    ctx.fillRect(game.x + game.zoom * (j + game.figure.x) + 1,
                                 game.y + game.zoom * (i + game.figure.y) + 1,
                                 game.zoom - 2, game.zoom - 2)


doc.addEventListener("keydown", key_down)
doc.addEventListener("keyup", key_up)
browser.timer.set_interval(do_game, fps)
```

參考資料

https://uupgrade.medium.com/python-%E9%82%A3%E4%BA%9B%E5%B9%B4%E6%88%91%E5%80%91%E4%B8%80%E8%B5%B7%E7%8E%A9%E9%81%8E%E7%9A%84%E9%81%8A%E6%88%B2-%E4%BA%8C-%E4%BF%84%E7%BE%85%E6%96%AF%E6%96%B9%E5%A1%8A-2250e08b72a6

https://levelup.gitconnected.com/writing-tetris-in-python-2a16bddb5318