

Deep Q Network on Little Fighter 2 - Progress Report

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Milestone:

M1: 11/25 Project proposal submission (已完成)

M2: 12/02 Trace Code (完成)

M3: 12/09 Design Model (完成)

M4: 12/16 Progress report (完成)

Trace Code:

Open Source Repo:

<https://github.com/Project-F/F.LF.git>

https://github.com/Project-F/LF2_19.git

LF2_19/AI/dumbass.js

```
define(function()
{
    function AIScript(self,match,controller) //a javascript class
    {
        //constructor
        // self - the character being controlled
        // match -to know what's happening in the game
        // controller - press keys on this controller
        //states
        var cc=0; //counter
        var dir=1;
        var DIR = ['left','right','up','down']; //number to direction mapping
        var target; //target opponent to chase after

        this.TU = function()
        { //this is the main AI routine that will be called once every 2 or 3 TU
```

在這份檔案主要是用來讓AI執行定義好的動作

match記錄了目前場地上的各種狀態

controller則是用值控制要執行的動作

target記錄目標(敵人)的狀態，例如血量、位置(x, z)等等

裡面定義了TU這一個function，每個tick會呼叫一次這個function，可以經由判斷target和match的狀態來讓AI進行不同的動作。

```
if( ((dx>0?1:-1)===self.dirh() && abs(dx)<200 && abs(dz)<10 && (self.state()===2 || self.state()===5))
//if target is in front of me and he is in range and I am running or dashing
|| (abs(dx)<50 && abs(dz)<10)) //or if I am very close to target
if( target.state()!==14) //and if he is not lying
{
    controller.keypress(DIR[dx>0?1:0]); //change direction
    controller.keypress('att'); //attack!
    return; //exit this function
}
```

在AI與target距離在攻擊範圍內且target並非倒地狀態時，會轉向並且攻擊他

```

var chase;
if( self.health.hp>150) //if I have enough health
    chase = true; //chase
else
    chase = false; //flight
if( abs(dx)<200) //not very far away
{
    //if chasing, walk towards him
    controller.key(DIR[dir],0); //keyup- release the previous key
    if( rand(3)===0) //30% chance of doing so
        dir = rand(4); //have random direction, wander around
    else if( abs(dx)>abs(dz)) //x distance is greater than z distance
        dir = dx>0===chase?1:0; //go to right if target is on the right
    else
        dir = dz>0===chase?3:2; //go to down if target is below
    controller.key(DIR[dir],1); //keydown only- hold the direction key
}
else
{
    //run towards him
    controller.key(DIR[dir],0); //keyup
    dir = dx>0?1:0;
    controller.keypress(DIR[dir]); //press 1st time
    controller.keypress(DIR[dir]); //press 2nd time, run!
}
}

```

AI 在與target距離兩百以內時,若血量為150以上會往當時target方向走去,若血量在150以下則逃離, 若距離與target超過兩百,則會用跑的去找target

```

if( cc%10===0) //less frequently
{
    var act = rand(4); //get a random number from [0,1,2,3]
    switch (act)
    {
        case 0: break; //do nothing
        case 1: controller.keypress('def'); break;
        case 2: controller.keypress('jump'); break;
        case 3: controller.keypress('att'); break;
    }
}

```

這個function每被呼叫十次時會額外多一個攻擊防禦或跳的按鍵, 使AI有機會放出招式

```

match.prototype.game_state=function()
{
    var $=this;
    var d={};
    d.time = $.time.t;
    for( var i in $.character)
    {
        var c = $.character[i];
        d[i] = [c.ps.x,c.ps.y,c.ps.z,c.health.hp,c.health.mp];
    }
    return d;
}

```

取得每個character的位置、hp、跟mp

```
game.html x match.js x character.js x Find Results
935 },
936
937 '15':function(event,K) //stop_running, crouch, crouch2, dash
938 {
939     var $=this;
940     switch (event) {
941
942     case 'frame':
943         switch( $.frame.N)
944         {
945             case 19: //heavy_stop_run
946                 if( $.hold.obj && $.hold.obj.type==='heavyweapon'
947                     $.trans.set_next(12);
948                 break;
949             case 215:
950                 $.trans.inc_wait(-1);
951                 break;
952             case 219: //crouch
953                 if( !$_.id_update('state15_crouch'))
954                     switch( $.frame.PN) //previous frame number
955                     {
956                         case 105: //after rowing
957                             $.mech.unit_friction();
958                             break;
959                         case 216: //after dash
960                         case 90: case 91: case 92: //dash attack
961                             $.trans.inc_wait(-1);
962                             break;
963                     }
964                 break;
965             case 54: //sky_lgt_wp_thw
966                 if( $.frame.D.next===999 && $.ps.y<0)
967                     $.trans.set_next(212); //back to jump
968                 break;
969         }
970     case 'combo':
971         if( $.frame.N===215) //only after jumping
972         {
973             if( K==='def')
974             {
975                 $.trans.frame(102, 10);
976                 return 1;
977             }
978             if( K==='jump')
979             {
980                 var dx=0;
981                 if($.con.state.left) dx-=1;
982                 if($.con.state.right) dx+=1;
983                 if( dx)
984                 {
985                     $.trans.frame(213, 10);
986                     $.switch dir(dx===1?'right':'left'):
987                 }
988             }
989         }
990     }
```

character.js 這個 function 裡面記錄了目前這個 character 的 state

1. standing
2. walking
3. running, heavy_obj_run
4. punch, jump_attack, run_attack, ...
5. etc....

Design Model:

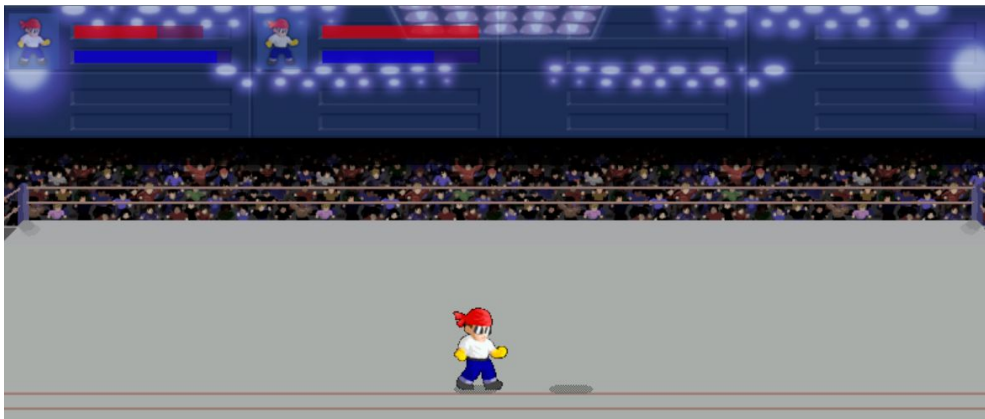
規則說明：

限定為一對一對決，一方為電腦AI(檔案dumbass.js)，另一方為我們訓練的模型。

角色選擇：Bandit，沒有技能可以使用的角色



場地選擇：HK Coliseum，擂台場地，場地較小人物不會跑出螢幕範圍，將會設定成不掉落道具



模型選擇：Deep Q Network

Observation：直接抓取角色的位置(x,y,z)、hp、狀態等組成一個vector作為observation

Actions：上、下、左、右、攻、跳、防

Reward：當自己的血量下降時，給一個負的reward，大小為損失的血量，反之則為正的reward，和平共處時+0

environment和agent的溝通:

利用file input output，environment將state寫進一個file給agent讀，agent將action寫進一個file 給enviroment使用。