**Final Animation Project**

Team name: “The Quartet”

%{

SCENE 1 - Jake Kaplan

%}

%% Play background music throughout all scenes.

[y,Fs] = audioread('ninja\_music.wav');

player = audioplayer(y,Fs);

play(player) % Start the music

%% Create background image

clf %This clears the figure, so remove this line if you want to preserve a plot you have already made

% This creates the 'background' axes

ha = axes('units','normalized', 'position',[0 0 1 1]);

% Move the background axes to the bottom

uistack(ha,'bottom');

% Load in a background image and display it using the correct colors

% The image used below, is just a Roadrunner scene I downloaded.

I=imread('NinjaHome.jpg');

hi = imagesc(I);

colormap gray;

% Turn the handlevisibility off so that we don't inadvertently plot into the axes again

% Also, make the axes invisible

set(ha,'handlevisibility','off', 'visible','off')

% Now we can use the figure, as required.

% For example, we can put a plot in an axes

%axes('position',[0.3,0.35,0.4,0.4])

filename = 'NinjaSword1.jpg';

ninjaColor =[0, 0, 1];

thresh = 219;

ninjasword1 = imread(filename);

ns1mtx = fJpeg2pointsConverter(ninjasword1, thresh);

[m,n]=size(ns1mtx);

fprintf("%s size (thresh=%i) , [%i,%i]",filename,thresh,m,n);

disp(m); disp(n);

ns1mtx = [ns1mtx;ones(1,n)]; %Make the matrix 3x3 by adding a row of 1s

S = [0.02 0 0; 0 0.02 0; 0 0 1]; %This is my rescaling matrix to shrink the character to fit the background

ns1mtx = S\*ns1mtx;

ns1mtx\_orig = ns1mtx;

%gif('Scene1\_2\_final.m.gif') %This function is used to create a gif

ninjaStarColor =[1, 1, 1];

% import the throwing star sprite

throwingStar = fJpeg2pointsConverter(imread("throwing-star.jpg"), thresh);

% get the size and convert the matrix to a set of homogenous coordinates

[m,n]=size(throwingStar);

throwingStar = [throwingStar;ones(1,n)];

% rescale the throwing star to the character

throwingStar = S\*throwingStar;

axesVisible = 'off';

axesXpos = 0;

axesYpos = 0;

axesXdim = 1.2;

axesYdim = 1;

%% Run towards the edge of the building (using shear)

ns1mtx = ShearHScene(ns1mtx,0.5);

hb = axes('units','normalized', 'position',[-0.2 .0625 axesXdim 1]);

r = 1/5;

numItr = 17.5;

for i=1:0.5:numItr

%hb = axes('position',[axesXpos axesYpos axesXdim axesYdim]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

Shift = [1 0 1; 0 1 0; 0 0 1];

ns1mtx = Shift\*ns1mtx;

ns1mtx = RotationScene(ns1mtx,r);

r = -1\*r;

%gif

pause(0.1)

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

ns1mtx = RotationScene(ns1mtx,r);

%% Reflect character and jump to left

ns1mtx = ShearHScene(ns1mtx,-0.5);

ns1mtx = ReflHScene(ns1mtx);

hb = axes('units','normalized', 'position',[-0.2 .0625 axesXdim 1]);

numItr = 12;

for i=1:numItr

%hb = axes('position',[axesXpos axesYpos axesXdim axesYdim]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

Shift = [1 0 -(6/numItr); 0 1 (6/numItr); 0 0 1];

ns1mtx = Shift\*ns1mtx;

%gif

pause(0.001)

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

%% Character scales the building

hb = axes('units','normalized', 'position',[-0.2 .0625 axesXdim 1]);

r = 1/9;

for i=1:9

%hb = axes('position',[axesXpos axesYpos axesXdim axesYdim]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

Shift = [1 0 0; 0 1 1; 0 0 1];

ns1mtx = Shift\*ns1mtx;

ns1mtx = RotationScene(ns1mtx,r);

r = -1\*r;

%gif

pause(0.2)

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

ns1mtx = RotationScene(ns1mtx,r);

%% Reflect character and jump to right (to reach roof)

ns1mtx = ReflHScene(ns1mtx);

hb = axes('units','normalized', 'position',[-0.2 .0625 axesXdim 1]);

for i=1:numItr

%hb = axes('position',[axesXpos axesYpos axesXdim axesYdim]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

Shift = [1 0 (5/numItr); 0 1 (5/numItr); 0 0 1];

ns1mtx = Shift\*ns1mtx;

%gif

pause(0.001);

set(h\_rr,'Visible','off'); % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) ;% This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off');;

end

characterCenter1 = centerPivot(ns1mtx);

x\_final = characterCenter1(1,1);

y\_final = characterCenter1(2,1);

fprintf("x\_final = %f", x\_final);

fprintf("y\_final = %f", y\_final);

%%

%{

SCENE 2 - Stephen Horn

%}

%ns1mtx = teleportTo(ns1mtx,35,25);

%% Lands on to roof

for i=1:5

hb = axes('units','normalized', 'position',[-0.2 .0625 1.2 1]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) ;

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

nS = [1 0 0.5 ; 0 1 -0.1; 0 0 1 ];

ns1mtx = nS\*ns1mtx;

%gif

pause(0.05);

set(h\_rr,'Visible','off');

axis([0 70 0 70]) ;

set( gca, 'color','none','handlevisibility','off','visible','off');

end

%% sneaks...

ns1mtx = squatScene(ns1mtx,1.8,0.6);

r=-1;

for i=1:28

hb = axes('units','normalized', 'position',[-0.2 .0625 1.2 1]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) ;

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

nS = [1 0 0.5 ; 0 1 0; 0 0 1 ];

ns1mtx = nS\*ns1mtx;

ns1mtx = squatScene(ns1mtx, 1.0 + (0.2\*r) , 1.0);

r=-1\*r;

%gif

pause(0.05);

set(h\_rr,'Visible','off');

axis([0 70 0 70]) ;

set( gca, 'color','none','handlevisibility','off','visible','off');

end

%% Character stands up from sneak position

algn = alignWith(ns1mtx, ns1mtx\_orig);

ns1mtx = algn;

for i=1:4

hb = axes('units','normalized', 'position',[-0.2 .0625 1.2 1]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) ;

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% sv + c

nS = [1 0 0.5 ; 0 1 0; 0 0 1 ];

ns1mtx = nS\*ns1mtx;

%gif

pause(0.05);

set(h\_rr,'Visible','off');

axis([0 70 0 70]) ;

set( gca, 'color','none','handlevisibility','off','visible','off');

end

nt4mtx = loadNinjaTool4('NinjaTool4.jpg');

Z = (-1)\*centerPivot(nt4mtx);

nt4mtx = ShiftScene(nt4mtx, Z(1),Z(2));

nt4mtx = [-1 0 0; 0 -1 0; 0 0 1]\*nt4mtx;

algn = alignWith(ns1mtx , nt4mtx);

nt4mtx = algn;

%% Frontflip

v=1;

for i=1:19

hb = axes('units','normalized', 'position',[-0.2 .0625 1.2 1]);

h\_rr = plot(hb,nt4mtx(1,:), nt4mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) ;

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% sv + c

nS = [1 0 0.4 ; 0 1 (-0.28)\*v+3; 0 0 1 ];

nt4mtx = nS\*nt4mtx;

nt4mtx = RotationScene(nt4mtx, -0.66 );

v=v+1;

%gif

pause(0.05);

set(h\_rr,'Visible','off');

axis([0 70 0 70]) ;

set( gca, 'color','none','handlevisibility','off','visible','off');

end

%% Lands and walks on roof

algn = alignWith(nt4mtx , ns1mtx);

ns1mtx = algn;

for i=1:6

hb = axes('units','normalized', 'position',[-0.2 .0625 1.2 1]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) ;

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

nS = [1 0 0.5; 0 1 0; 0 0 1];

ns1mtx = nS\*ns1mtx;

%gif

pause(0.05);

set(h\_rr,'Visible','off');

axis([0 70 0 70]) ;

set( gca, 'color','none','handlevisibility','off','visible','off');

end

%% Jumps off roof to the edge of the screen

for i=1:5

hb = axes('units','normalized', 'position',[-0.2 .0625 1.2 1]);

h\_rr = plot(hb,ns1mtx(1,:), ns1mtx(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) ;

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

nS = [1 0 1.5 ; 0 1 1; 0 0 1 ];

ns1mtx = nS\*ns1mtx;

%gif

pause(0.05);

set(h\_rr,'Visible','off');

axis([0 70 0 70]) ;

set( gca, 'color','none','handlevisibility','off','visible','off');

end

characterCenter2 = centerPivot(ns1mtx);

x\_final = characterCenter2(1,1);

y\_final = characterCenter2(2,1);

fprintf("x\_final = %f", x\_final);

fprintf("y\_final = %f", y\_final);

%{

SCENE 3 - Andrew Brown

%}

% Call scene three function

failureFlag = false;

[failureFlag, ns1mtx, characterCenter, throwingStar1, throwingStar2] = third\_scene(ns1mtx, [x\_final, y\_final], throwingStar, throwingStar, ninjaColor, ninjaStarColor, axesVisible);

x\_final = characterCenter(1,:);

y\_final = characterCenter(2,:);

%%

%{

SCENE 4 - Giovanni Amado

%}

% =======

CA=imread('NinjaSword1.jpg');

CAout=fJpeg2pointsConverter(CA,219);

CD=imread('NinjaSword3.jpg');

CDout=fJpeg2pointsConverter(CD,219);

CF=imread('NinjaTool2.jpg');

CFout=fJpeg2pointsConverter(CF,219);

CG=imread('NinjaTool3.jpg');

CGout=fJpeg2pointsConverter(CG,219);

CI=imread('SmokeBomb.jpg');

CIout=fJpeg2pointsConverter(CI,219);

CB=imread('ninjalogo1.jpg');

CBout=fJpeg2pointsConverter(CB,219);

S = [0.025 0 0; 0 0.025 0; 0 0 1];

A=CAout;

[m,n1]=size(CAout);

disp(m); disp(n1);

CAout = [CAout;ones(1,n1)];

S = [0.025 0 0; 0 0.02 0; 0 0 1];

CAout = S\*CAout;

B=CBout;

[m,n2]=size(CBout);

disp(m); disp(n2);

CBout = [CBout;ones(1,n2)];

S = [0.025 0 0; 0 0.02 0; 0 0 1];

CBout = S\*CBout;

D=CDout;

[m,n3]=size(CDout);

disp(m); disp(n3);

CDout = [CDout;ones(1,n3)];

S = [0.025 0 0; 0 0.02 0; 0 0 1];

CDout = S\*CDout;

F=CFout;

[m,n4]=size(CFout);

disp(m); disp(n4);

CFout = [CFout;ones(1,n4)];

S = [0.025 0 0; 0 0.02 0; 0 0 1];

CFout = S\*CFout;

G=CGout;

[m,n5]=size(CGout);

disp(m); disp(n5);

CGout = [CGout;ones(1,n5)];

S = [0.025 0 0; 0 0.02 0; 0 0 1];

CGout = S\*CGout;

I=CIout;

[m,n6]=size(CIout);

disp(m); disp(n6);

CIout = [CIout;ones(1,n6)];

S = [0.02 0 0; 0 0.02 0; 0 0 1];

CAout(3,12878);

Z=zeros(3,279);

CAout\_New= [CAout,Z];

CFout(3,12172);

Z1=zeros(3,985);

CFout\_New=[CFout,Z1];

CGout(3,12078);

Z2=zeros(3,94);

CGout\_New=[CGout,Z2];

Z3=zeros(3,1831);

CGout\_New2=[CGout,Z3];

CIout(3,13909);

Z4=zeros(3,12245);

CIout\_New=[CIout,Z4];

disp(S)

shM = [ 1 0 1; 0 1 0; 0 0 1];

CAout\_New = shM \* S\*CAout\_New;

CDout = shM \* S\*CDout;

CFout\_New= shM \* S\*CFout\_New;

CFout = shM \* S\*CFout;

CGout\_New= shM \* S\*CGout\_New;

CGout\_New2= shM \* S\*CGout\_New2;

CIout = shM \* S\*CIout;

CIout\_New = shM \* S\*CIout\_New;

CBout = shM \* S\*CBout;

for k=0:1/4:1

B = (1-k)\*CAout\_New + k\*CDout;

hb = axes('units','normalized', 'position',[0.4 0 0.2 0.1]);

h\_rr = plot(hb,B(1,:),B(2,:),'.', 'color', ninjaColor, 'MarkerSize', 1);

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%gif

pause(0.25)

set(h\_rr,'Visible','off')

end

for k=0:1/4:1

B = (1-k)\*CDout + k\*CFout\_New;

hb = axes('units','normalized', 'position',[0.4 0 0.2 0.1]);

h\_rr = plot(hb,B(1,:),B(2,:),'.', 'color', ninjaColor, 'MarkerSize', 1);

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%gif

pause(0.25)

set(h\_rr,'Visible','off')

end

for k=0:1/4:1

B = (1-k)\*CFout + k\*CGout\_New;

hb = axes('units','normalized', 'position',[0.4 0 0.2 0.1]);

h\_rr = plot(hb,B(1,:),B(2,:),'.', 'color', ninjaColor, 'MarkerSize', 1);

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%gif

pause(0.25)

set(h\_rr,'Visible','off')

end

for k=0:1/4:1

B = (1-k)\*CGout\_New2 + k\*CIout;

hb = axes('units','normalized', 'position',[0.4 0 0.2 0.1]);

h\_rr = plot(hb,B(1,:),B(2,:),'.', 'color', ninjaColor, 'MarkerSize', 1);

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%gif

pause(0.25)

set(h\_rr,'Visible','off')

end

for k=0:1/4:1

B = (1-k)\*CIout\_New + k\*CBout;

hb = axes('units','normalized', 'position',[0.4 0 0.2 0.1]);

h\_rr = plot(hb,B(1,:),B(2,:),'.', 'color', ninjaColor, 'MarkerSize', 1);

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%gif

pause(0.25)

set(h\_rr,'Visible','off')

end

stop(player) % Stop the music after the animation is complete.

disp('script completed');

%{

----------------------------------------------------------

Functions below

%}

function PPt = teleportTo(PP,tx,ty)

nc = centerPivot(PP);

nP = [1 0 -1\*nc(1) ; 0 1 -1\*nc(2); 0 0 1 ];

zPP = nP\*PP;

nS = [1 0 tx ; 0 1 ty; 0 0 1 ];

PPt = nS\*zPP;

end

function PPal = alignWith(PPprevmtx , newmtx )

[Mrows Ncols] = size(PPprevmtx);

center = feetPivot(newmtx);

newzzero = ShiftScene(newmtx, -1.0\*center(1,1), -1.0\*center(2,1));

prevc = feetPivot(PPprevmtx);

if Mrows == 3,PPal = newzzero + prevc;

else, PPal = newzzero + prevc(1:2 , :);

end

end

function PPq = squatScene(PP, xq, yq )

[Mrows Ncols] = size(PP);

if Mrows == 2, SH = [xq 0 ; 0 yq];

else , SH = [xq 0 0; 0 yq 0; 0 0 1];

end

center = feetPivot(PP);

PPz = ShiftScene(PP, -1.0\*center(1,1), -1.0\*center(2,1));

if Mrows == 3,PPq = (SH\*PPz) + center;

else, PPq = (SH\*PPz) + center(1:2 , :);

end

end

function nt4mtx = loadNinjaTool4(filename)

thresh = 219;

ninjatool4 = imread(filename);

nt4mtx = fJpeg2pointsConverter(ninjatool4, thresh);

[m,n]=size(nt4mtx);

fprintf("%s size (thresh=%i) , [%i,%i]",filename,thresh,m,n);

disp(m); disp(n);

nt4mtx = [nt4mtx;ones(1,n)];

%This is my rescaling matrix to shrink the character to fit the background

S = [0.025 0 0; 0 0.025 0; 0 0 1];

nt4mtx = S\*nt4mtx;

end

function fpiv = feetPivot(PP)

% Get a pivot point at the feet of the character.

uX = max(PP(1,:));

lX = min(PP(1,:));

%uY = max(PP(2,:));

lY = min(PP(2,:));

fpiv = [ mean([uX,lX]) ; lY ; 0];

end

function PPshh = ShearHScene(PP,k)

[Mrows Ncols] = size(PP);

if Mrows == 2,

SH = [1 k ; 0 1];

else ,

SH = [1 k 0; 0 1 0; 0 0 1];

end

center = feetPivot(PP);

PPz = ShiftScene(PP, -1.0\*center(1,1), -1.0\*center(2,1));

if Mrows == 3,

PPshh = (SH\*PPz) + center;

else ,

PPshh = (SH\*PPz) + center(1:2 , :);

end

end

function cent = centerPivot(PP)

% Assume these points are moved into a scene frame.

uX = max(PP(1,:));

lX = min(PP(1,:));

uY = max(PP(2,:));

lY = min(PP(2,:));

cent = [ mean([uX,lX]) ; mean([uY,lY]) ; 0];

end

function PPrs = RotationScene(PP,radAngle)

th=radAngle;

[Mrows Ncols] = size(PP);

if Mrows == 2 ,

R = [cos(th) -sin(th); sin(th) cos(th)];

else ,

R = [cos(th) -sin(th) 0; sin(th) cos(th) 0 ; 0 0 1];

end

center = centerPivot(PP);

PPz = ShiftScene(PP, -1.0\*center(1,1), -1.0\*center(2,1));

Prot = R\*PPz;

PPrs = Prot + center;

end

function PPshsc = ShiftScene(PP,xD,yD)

Shift = [1 0 xD; 0 1 yD; 0 0 1];

[Mrows Ncols] = size(PP);

if Mrows == 2,

N1 = [PP(1,:) ; PP(2,:) ; ones(1,Ncols)];

else ,

N1 = PP;

end

shN1 = Shift\*N1;

if Mrows == 2,

PPshsc = [shN1(1,:) ; shN1(2,:)];

else ,

PPshsc = shN1;

end

end

function PPrefl = ReflHScene(PP)

[Mrows Ncols] = size(PP);

if Mrows == 2,

RE = [-1 0 ; 0 1];

else ,

RE = [-1 0 0; 0 1 0; 0 0 1];

end

center = feetPivot(PP);

PPz = ShiftScene(PP, -1.0\*center(1,1), -1.0\*center(2,1));

if Mrows == 3,

PPrefl = (RE\*PPz) + center;

else ,

PPrefl = (RE\*PPz) + center(1:2 , :);

end

end

function PPout = fJpeg2pointsConverter(BB,THRESHOLD)

BB1=BB(:,:,1);

[M, N]= size(BB1);

BB1=double(BB1);

BB2 = 255-BB1;

BB3 = (BB2 > THRESHOLD);

PP=zeros(2,M\*N);

cnt=0;

for ii=1:M,

for jj=1:N,

if (BB3(ii,jj)>0.5),

PP(:,cnt+1)=[jj;N-ii];

cnt=cnt+1;

end,

end,

end

PPout = PP(:,1:cnt);

end

function [failureFlag, character, characterCenter, throwingStar1, throwingStar2] = third\_scene(character, characterCenter, throwingStar1, throwingStar2, ninjaColor, ninjaStarColor, axesVisible)

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Setup the nessecary matrices

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% have the character fall into the scene

fallTransformation = [1 0 0.2; 0 1 -1; 0 0 1];

% landing matrices.

compressionTransformation = [1 0 0; 0 0.90 0; 0 0 1];

decompressionTransformation = inv(compressionTransformation);

% This transformation matrix is used to move the ninja stars across the scene

throwingTransformation1 = [1 0 1.05; 0 1 -0.25; 0 0 1];

throwingTransformation2 = [1 0 1; 0 1 0 ; 0 0 1];

throwingRotationTransformation = [1 0 0; 0 1 0; 0 0 1];

% running transformation matrix

runningTransformation = [1 0 1; 0 1 0; 0 0 1];

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Perform the Animation

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

character = teleportTo(character, 10, 23);

% character falls into scene from the previous building jump

% character lands

% character throws ninja star at target

% runs past target to the middle of the scene

% throws ninja star at second target

% have the character fall into scene

for j = 1:20

% setup the plot for the animation frame

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rr = plot(hb,character(1,:), character(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% perform the transformation

character = fallTransformation \* character;

pause(0.01);

%gif

% perform final setup for the animation

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

% upon landing compress the character slightly to mimick a energy capture after landing

for j = 1:3

% setup the plot for the animation frame

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rr = plot(hb,character(1,:), character(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% perform the transformation

character = compressionTransformation \* character;

pause(0.01);

%gif

% perform final setup for the animation

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

% decompress to stand back up

for j = 1:3

% setup the plot for the animation frame

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rr = plot(hb,character(1,:), character(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% perform the transformation

character = decompressionTransformation \* character;

pause(0.01);

%gif

% perform final setup for the animation

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% the main emphasise is on the throwing star but I need the character to be visible.

% I plot the character here and later set his visibility to off

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rrCharacterBackground = plot(hb, character(1,:), character(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

throwingStar1 = moveToCharacterHand(character, throwingStar1);

% throw ninja star at first target

for j = 1:8

% setup the plot for the animation frame

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rr = plot(hb, throwingStar1(1,:), throwingStar1(2,:), '.', 'color', ninjaStarColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% perform the transformation

throwingStar1 = throwingTransformation1 \* throwingStar1;

throwingStar1 = RotationScene(throwingStar1, -0.8);

%throwingStar1 = RotationScene();

pause(0.01);

%gif

% perform final setup for the animation

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% draw throwingStar1 to the screen as background image

% I will never touch this again as the throwing star will stay right where it has landed

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rrThrowingStar1Background = plot(hb, throwingStar1(1,:), throwingStar1(2,:), '.', 'color', ninjaStarColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

throwingStar2 = moveToCharacterHand(character, throwingStar2);

% throw ninja star at second target

for j = 1:46

% setup the plot for the animation frame

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rr = plot(hb, throwingStar2(1,:), throwingStar2(2,:), '.', 'color', ninjaStarColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% perform the transformation

throwingStar2 = throwingTransformation2 \* throwingStar2;

throwingStar2 = RotationScene(throwingStar2, -0.8);

pause(0.05);

%gif

% perform final setup for the animation

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% destroy the background character as he is now the main focus

% perform final setup for the animation

set(h\_rrCharacterBackground,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% draw throwingStar2 to the screen as background image

% I will never touch this again as the throwing star will stay right where it has landed

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rrThrowingStar2Background = plot(hb, throwingStar2(1,:), throwingStar2(2,:), '.', 'color', ninjaStarColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% run to middle of the scene

for j = 1:33

% setup the plot for the animation frame

hb = axes('units','normalized', 'position',[-0.2 0.0625 1.2 1]);

h\_rr = plot(hb, character(1,:), character(2,:), '.', 'color', ninjaColor, 'MarkerSize', 1);

axis([0 70 0 70]) %This let me set the scale I wanted in the inserted axes

set(gca,'color','none','handlevisibility',axesVisible,'visible',axesVisible)

% perform the transformation

character = runningTransformation \* character;

pause(0.02);

%gif

% perform final setup for the animation

set(h\_rr,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

end

% perform final setup for the animation

set(h\_rrCharacterBackground,'Visible','off') % This line erases the image of the Road Runner and Wile E. Coyote

axis([0 70 0 70]) % This let me set the scale I wanted in the inserted axes

set( gca, 'color','none','handlevisibility','off','visible','off')

characterCenter = centerPivot(character);

failureFlag = false;

end

% This function takes a character and morphs into a different shape specified by the caller

% NOTE: this function only performs one step of the morph it must be called regularly untill the desired image is created.

% input:

% originalImage : the matrix containing the original Image to be morphed

% templateImage : the image to transform the original image into

%

% output:

% the result of step the of the morph

function outputImage = morph(originalImage, templateImage, mixingProportion)

outputImage = (1-mixingProportion) \* originalImage + mixingProportion \* templateImage;

end

% This funtion moves whatever sprite is passed in to the characters hand

% input:

% character : the character matrix

% sprite : the sprite to move to the characters hand

% NOTE: sprite must be in a homogenous coordinate system.

%

% output:

% outputSprite = The resulting sprite in the proper position

function sprite = moveToCharacterHand(character, sprite)

% get the center of the character

characterCenter = centerPivot(character);

% move to the center of the character

sprite = teleportTo(sprite, characterCenter(1,:), characterCenter(2,:));

%translation matrix for moving from the center of the character to the hand

translateToHand = [1 0 2; 0 1 1; 0 0 1];

% translate to the characters hand

sprite = translateToHand \* sprite;

end