Study on Unity 3d Character Animation in Mecanim Animation System

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Abstract. Unity 3d appeared new animation system Mecanim since version 4.0, and it promotes the role of animation production in the game to a new level. Animation of the role of good and bad, will directly affect the operation and real sense of users. In this paper, we mainly study on using animation state machine of which is new animation system Mecanim in Unity 3d.

Introduction
Old version of animation control process is complex and animation action cannot be reused, not only code compilation is tedious, use efficiency is low, but also compared to the previous animation system, Unity 3d 4.0 platform for the development of animation system in using and controlling more flexible and efficient.
Retageting in the system Mecanim can make an animation action repeated use, and human animations can be decaled with the roles of the various animation in a graphical way, through the use of animation state machine to control the transition and logic. Moreover, it is convenient for animation role to align and rank. For local action of the body, can use animation layer or body mask processing animation, which is different in various parts of the body, can also be convenient to preview the animation clips.

Study on the Animation State Device
Animation state device is a visual interface editor which can operate the animation, if we want to use animation clips on an import role model, the first is to establish a state animator in the project panel, as shown in the left of Figure 1. In this animator, we can establish multiple animation state. When choosing role animation clips, inspector of motion must is the Avatar which has been some movement fragment. According to Avtar of animation clips with the skeletal structure of the human body, we can make the different character animation be used in different roles, so we break up the limitation that the previous animation can only be used in one role.
In the interface editor, we created three animation state by the create state, and the animation state they were named as idle, run, and jump animation. Then the animation of this state is assigned to the role.

Figure 1. Three animation state.
Using Play Time to Control Animation Transition

When the role using animation controller of which created in the project, the role will directly use the acquiescent animation state, when we running Unity 3D, the role will play default state of the animation idle. If we want to transited animation by a state (idle state) over to another (run). Then we can create animation between two or more states. Selecting a state through the use of “Make Transition”, we can create the line between the animation, such as shown in the figure on the right.

After transition is created, how to trigger between animation and over it, that is to say this role jump by a state of animation to another animation state. Mecanim provides a variety of ways to control the conversion in the animation, we can through using play time of animation, animation parameters and use conditions to control the animation transition. As shown in Figure 2, in the conditions there are some logic control parameters and they can be a Boolean variable, can be a numeric variable, even can be the length of time. In the creator 0.8 means when animation idle broadcast into the animation of percent eighty, it will lead transition jump to the animation playback state. The run to the idle, we can still use time to control. Such simple animation transition, we use this intelligence is relatively simple and convenient, but if we deal with some complex animation with transition, it is necessity for human logic to control.

![](image)

Figure 2. Animation transition.

Logic Judgment to Control Animation Transition

As for some complex animation, we will use the way of code with Mecanim system to carry on the animation control. Below is to use animation parameters to control the animation transition, the first in the parameters of Animation palette set a parameter for Boolean variables, this time the default state is no play, then we choose ready Boolean variables jump in the animation control line. The control role by running state to jumping state as shown in the following code:

```csharp
protected Animator haveAnimator;

void Start () {
    animator = GetComponent<Animator>();
}

void Update () {
    if (haveAnimator) {
        AnimatorStateInfo state Information = animator.GetCurrentAnimatorStateInfo(0)
        if (stateInfo.IsName("Base Layer.Run")) {
            if (Input.GetKey(Space))
                animator.SetBool("Jump", true);
            else
                animator.SetBool("Jump", false);
        }
    }
}
```
The Use of Mask and Bleeding Tree

In the new animation system to the development of convenient and efficient place, provide the mask 2D Blending tree mask can make the character at the same time to perform a wide variety of animation and animation will not affect each other. Such as: the role in the process of running can were waved Hello, shooting games in role can run while shooting.

In the animation controller, we will first in the base layer in newly established a layer of the animation and the animation layer named for arms layer, and the weight value of the weight is set to 1, the body mask selection RightArm. Here need to explain is why we want to create a new layer, because the layer is a priority, with respect to the animation and logic layer on layer of is give priority to the implementation of the right, as shown in Figure 3.

Wave animation code:

```csharp
if (Input.GetButtonDown("Fire2") && animator.layerCount >= 2)
{
    animator.SetBool("Hi", !animator.GetBool("Hi"));
}
```

Figure 3. Wave animation.

Blending Tree is a kind of compound Blending animation section, and it can be as a node in the Mecanim animation state machine. Blending Tree can synthesize several similar animation section into a composite of animation, therefore it is an animation synthesizer. Such as: the role of forward run, run to the right and to left. We can not only synthesize the three animation into a composite animation through the use of Blending Tree, also through the adjustment of parameters making the animation at different time points presents different animation effects, The true is essentially the three animated overlay effect on different nodes.

In Mecanim animation state machine, we can create a Bleeding Tree through “From new Bleeding” in CreatState. The Bleeding Tree in the motion parameters are selected to run ,run and run to the right. The Bleeding Tree set parameters, then we need to write a simple program language to realize the three in the scene animation section, as shown in Figure 4.

Figure 4. Run.
protected Animator haveAnimator;
    public float DirectionDampTime = .25f;
    public bool ApplyGravity = true;
    void Start () {
        haveAnimator = GetComponent<Animator>();
        if(animator.layerCount >= 2){
            animator.SetLayerWeight(1, 1);
        }
    }
    void Update () {
        if (haveAnimator) {
            AnimatorStateInfo stateInfo = animator.GetCurrentAnimatorStateInfo(0);
            if (stateInfo.IsName("Base Layer.Run")) {
                if (Input.GetButton("Fire1")) animator.SetBool("Jump", true);
                else {
                    animator.SetBool("Jump", false);
                }
            }
            if(Input.GetButtonDown("Fire2") && animator.layerCount >= 2) {
                animator.SetBool("Hi", animator.GetBool("Hi"));
            }
            float h = Input.GetAxis("Horizontal");
            float v = Input.GetAxis("Vertical");
            animator.SetFloat("Speed", h*h+v*v);
            animator.SetFloat("Direction", h, DirectionDampTime, Time.deltaTime);
        }
    }

Summary
Mecanim support the animation character is the better for supporting the animation character. It provides a simple workflow and set, a reorientation of the animation, using the complex interaction with visual programming tools for managing animation, and on different parts of the body with different logic to control animation. On biological, animated props, like four legged animals character design provides generic role. In addition to the reorientation of the animation, but also to achieve the set animation clips, interaction between fragments, setting state machine and mixed tree, lists animation parameters, and through code control animation function. Mecanim animation state machine greatly improve the development cost and efficiency of the developers, at the beginning of Scholars are more easy to get started.

References