北京邮电大学 本科毕业设计（论文）初期进度报告

Project Early-term Progress Report

学院 School	International School	**专业 Programme**	**e-Commerce Engineering with Law**		
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论文题目 Project Title	Large-scale scene simulation of games in cold-temperate deciduous coniferous forest area based on UE				

已完成工作 Finished work:

• Summary of material was read or researched (not just list of references)

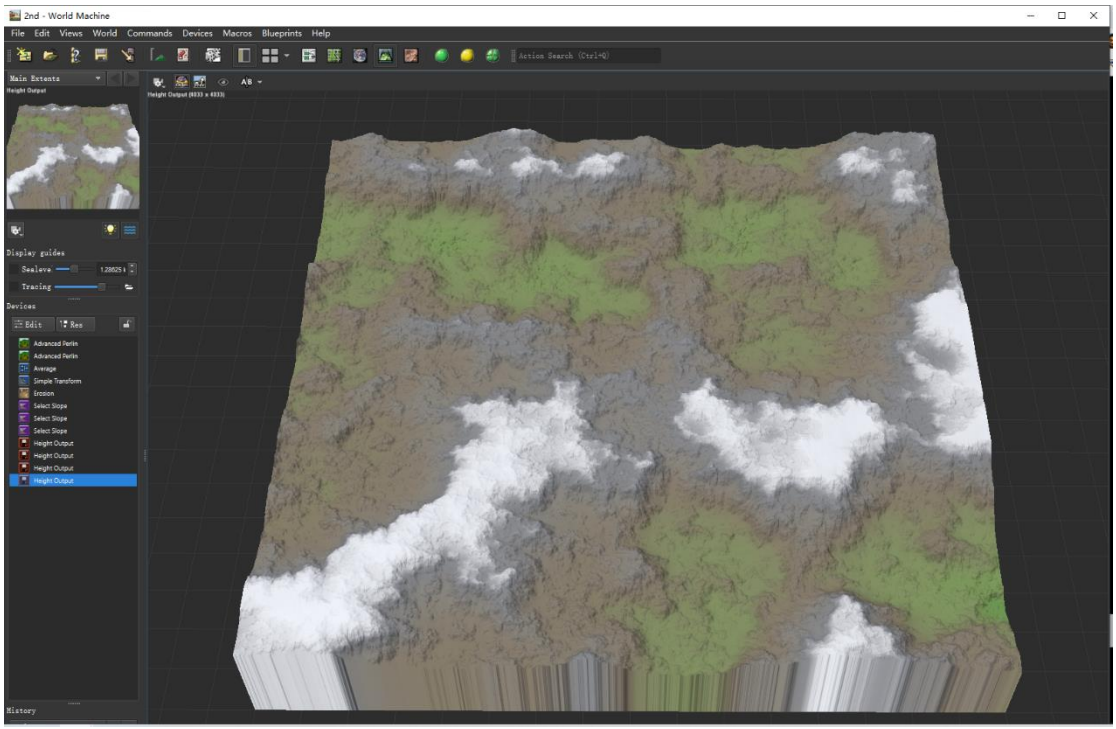
1. In terms of reading and research materials, I first read the official documents of Unreal 4 and Unreal 5. Using the official documents to view the specific code is helpful for my initial cognition. The official documents of Unreal have sufficient support for beginners and are equipped with starter package content
   https://docs.unrealengine.com/4.27/zh-CN/

2. Secondly, I watched the PCG experience sharing recommended by the professor. This article introduces the basic process of realizing PCG in the industry and constructs a basic pipeline.
   https://zhuanlan.zhihu.com/p/348952909
   When I started writing, I watched many video tutorials to help me understand the details and practice of PCG Unreal Open World - Getting Started
   https://www.youtube.com/watch?v=Nu4VMNb93Hc&list=PLNTm9yU0zou7kKcN7091Rdr322Qge5LNA
3. When doing the research on Soil and vegetation in the cold zone, I consulted the following papers to help me understand the specific types of soil and vegetation: including the vertical distribution and horizontal distribution of vegetation, such as tree species: birch and pine, shrub, fern, weed, etc; Soil type: the whole temperate humid broad-leaved forest belt mainly develops coloured brown soil and gray brown soil, and the semi humid forest grassland belt develops cinnamon soil and black soil.

• Summary of work was done (add as much details as you have)

1. **Material library (week 1)**
   Determine the type of material library and use the official UE material libraries Quixel Bridge and speed tree. Vegetation is divided into grass materials, 3D assets and trees, which are obtained from Quixel Bridge and speed tree.
2. **Map (weeks 2 and 3)**
   Using world machine to generate the experimental map and import it into UE
   1) Advanced Perlin, parameter adjustment, average value, simple transform,
   2) Erosion: duration, rock hardness, filter strength etc.
   3) Terrace Number of Terraces, Terrace Shape, Terrace Layering
   4) Select Slope: High, Medium, Low for three different hight

5) Height Output: in RAW16 format



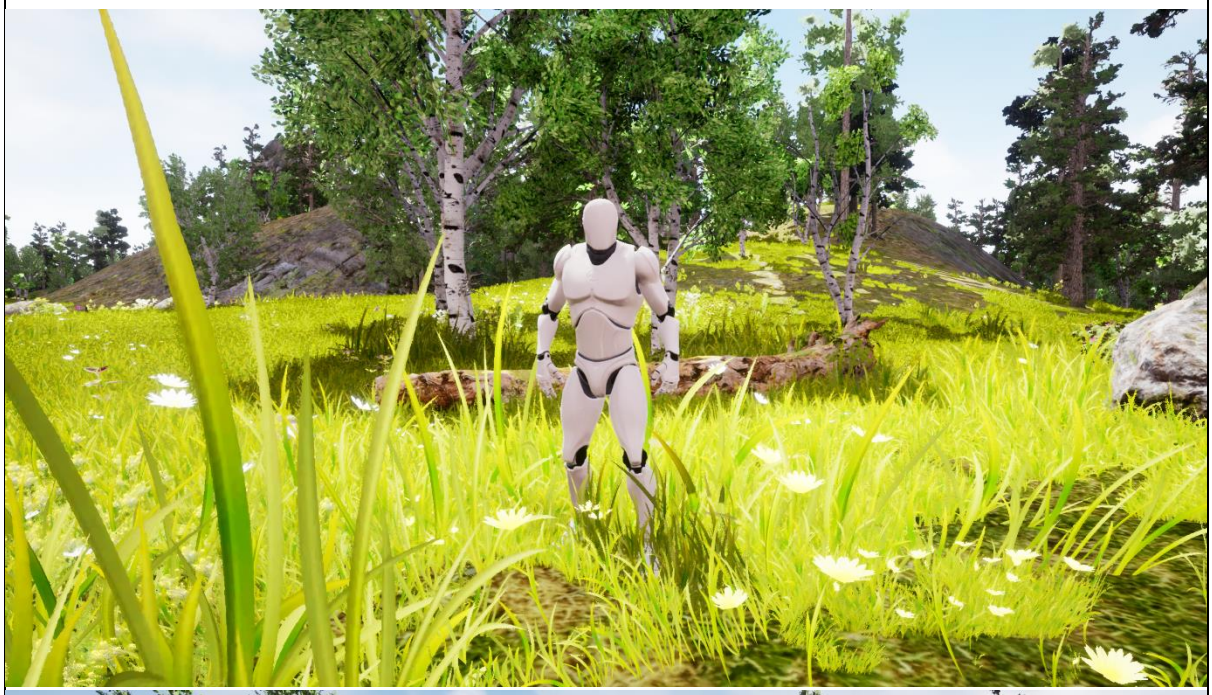
3. **Practice using Houdini to generate terrain.**
   Generated the basic terrain, mountains, lakes, plains, etc. Then add plain erosion effect and basically complete the general model. Since Houdini route requires additional software, it is convenient to recycle to the limit after release. After discussion with the tutor, this route is abandoned and developed using the PCG tool provided by ue5.
4. **Terrain material production (weeks 4 and 5):**
   - Texture, set mixed materials, including rock, snow, grass and grass_ dirt、Auto
     1) The auto layer mixes rock and grass layers, and sets slope and bias parameters to adjust the effect of automatically generated grass and rock. Other layers are manually modified.
   - Complete 5 layers of terrain material mixing: gravel, soil, grass, rock and snow mountain.
     1) Set two parameters, blend bias and blend sharpness, to control the blending distance and intensity.
     2) Add two kinds of distance scaling to control the repetition of materials at close and long distances. Add noise to the material to avoid duplication.
   - Collect 30 kinds of assets, including surface, 3D assets, plants and materials, and add them to the terrain materials
5. **Operating skills: Unreal 5, scene demo.**
   - Learn to set bookmarks and fix the camera position when creating terrain for easy development.
   - Learning group setting and modular development (small room in demo). Modular development can make assets easy to manage.
   - Add the wind attribute to the vegetation attribute to create the feeling of vegetation floating with the wind.
   - Learn about the creation of water, including specular reflection.
6. **Programmed plants (weeks 5 and 6)**
   Complete the programmed generation of plants: grass, shrubs, trees and stones. The generation density and location can be adjusted freely. Two different methods are used for automatic generation. Grass and shrubs are automatically generated on the grass layer or on the layer mixed with soil;

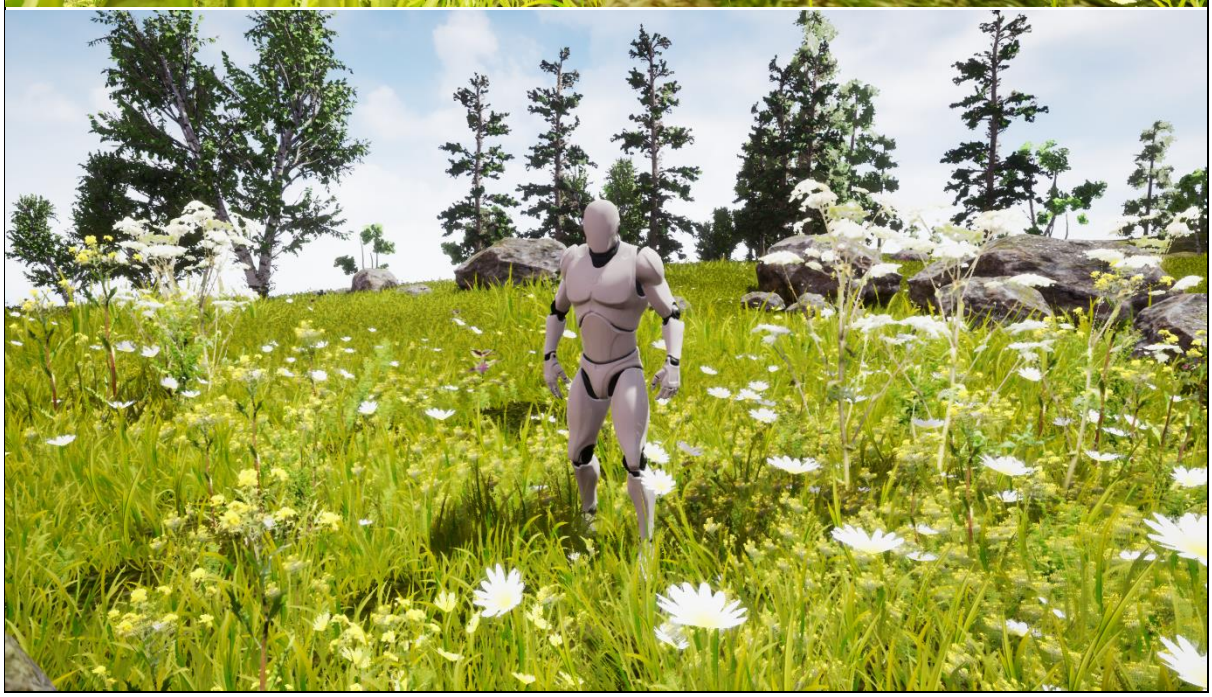
The tree uses the programmed plant components of UE4 to generate on the slope (relatively flat terrain) with a terrain slope of 0-25 degrees.

Finding the relevant plant model adds several vegetation and enriches the community level; It increases the geomorphic details and levels and the richness of cold zone tree species groups. Complete programmed plant generation 2.0

7. Plant clusters (week 7 to present)

1) Find the vertical distribution of plants (trees and shrubs) in the cold zone (Changbai Mountain and Daxinganling), and modify the programmed plant species according to the paper.
2) According to the paper, the plant groups were modified. Birch is added as a new tree species, and Composite and bilberry are added as shrubs. Increased diversity.
3) Colour the whole environment material (leaves, grass, shrubs, etc.) map in the later stage to make its appearance as uniform as possible.





是否符合进度? On schedule as per GANTT chart?
[YES/NO] YES

下一步 Next steps:

1. Snow effect, make UE snow effect, and be compatible with the original project.
2. Establish realistic game scenes in cold temperate zone through simulation of sun height and snow effect.
3. A systematic review of vegetation types and growth patterns in the cold temperate zone.