Mathematics

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Abstract

The article gives a brief and concise explanation to game mathematics. This article has been formatted, so whether or not you are currently a game programmer, actively working on a game team, or completely in the dark about this mysterious field, this article has something for you. If you're experienced, you'll find this article a light refresher to the subject, and if you're deciding whether or not to delve into the field of game mathematics, this article may help you make that significant decision. We all know mathematics is the most import part in the programing. But in the game, mathematics is the most amazing thing let game work more interesting. It's not that we necessarily excluded anything from this article, but it would be unrealistic to try and cover every possible aspect in a few pages.

Keywords: game, game mathematics

1 Introduction

Game mathematics is the soul of a game. Game mathematics let the game become more real. The most frequently used framework to perform such calculation using a computer is called the Cartesian coordinate system. We address the following concepts in this article:

- ✔ Why is mathematics important in games?
- ✔ What type of mathematics?
- ✔ Where is mathematics used?
- ✔ Vectors
- ✔ Matrices
- ✔ Transforms

[Dr.Kenwrigh 2016]

What the mathematics for? The mathematics is about measuring locations, distances, and angles precisely and mathematically in 3D space.

2 Overview

To know the mathematics. First we should know 1D mathematics, 2D Cartesian space and screen space. Second, we need know how to locating point in 2D. Third, 3D Cartesian space is the most important thing in the today's large game and locating points in 3D. Last, is about angles(radians and degrees) and vectors and scalars.

3 Methods/Techniques

In the mathematics, there has some part of the mathematics in the game.

- 1D Mathematics We assume that you already know about the natural numbers, the integers, the rational numbers, and the real numbers.On a computer you have to make do with shorts, ints, floats, and doubles. These have limited precision. We assume that you have a basic understanding about how numbers are represented on a computer. Remember the First Law of Computer Graphics: If it looks right, it is right.
- 2D Cartesian Space All that really matters are the numbers. The abstract version of this is called a 2D Cartesian coordinate space.
- Screen Space But it doest't have to be this way. It's only a convention. In screen space, for example, +y points down. Screen space is how you measure on a computer screen, with the origin at the top left corner.
- 3D Cartesian Space Are you using any external libraries or resources to implement your graphical scene? If you are using any libraries outside the ones developed in the practical sessions, these will need to be described here.
- Angles An angle measures an amount of rotation in the plane. Variables for angles are often given the Greek letter θ. The most important units of measure are degrees ($^\circ$) and radians(rad). Humans usually measure angles using degrees. One degree measures 1/360th of a revolution, so 360° is a complete revolution. Mathematicians, prefer to measure angles in radians, which is a unit of measure based on the properties of a circle. When we specify the angle between two rays in radians, we are actually measuring the length of the intercepted arc of a unit circle.
- Radians and Degrees The circumference of a unit circle is 2π radians, with π approximately equal to 3.14159265359. Therefore, 2π radians represents a complete revolution. Since $360^\circ = 2\pi$ rad, $180^\circ = \pi$ rad. To convert an angle from radians to degrees, we multiply by $180/\pi \approx 57.29578$ and to convert an angle from degrees to radians, we multiply by $\pi/180 \approx 0.01745329$.
- Vectors and Scalars An "ordinary number" is called a scalar. Algebraic definition of a vector: a list of scalars in square brackets. Eg. [1, 2, 3]. Vector dimension is the number of numbers in the list (3 in that example). Typically we use dimension 2 for 2D work, dimension 3 for 3D work. We'll find a use for dimension 4 also, later.

4 Conclusion

At the video game invented, mathematics is the most important thing in the game. Mathematics let game become more interesting. Without mathematics video game can't be created. Why mathematics is so important? Because almost every video game have 2D or 3D space. The mathematics can be very useful for the video game to let the program know where is the point. Mathematics is so import that every video need it. To know well about mathematics is very useful.

References

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