Mathematics

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Abstract

The game need use the mathematics.The 3D game using 3D math the 3D math is all about measuring locations, distances,and angles precisely and mathematically in 3D space. The most frequently used framework to perform such calculations using a computer is called the Cartesian coordinate system.The 2D game also need to use mathematics Cartesian Space and locating points.The mathematics have some problem i want to explaining the problem in the overview.

Keywords: type of mathematics, Vectors , Matrices, Transforms

1 Introduction

question list:

- What is the difference between a point and a vector?
  Vectors and points are very different things, they often seem similar to programmers because they are usually represented the same way in a programming context (a set of xyz coords). A point represents a location, a vector represents a direction and a magnitude. When you store a vector as x,y,z what you"re saying is that the vector represents the direction of a line beginning at (0,0,0) and ending at the point x,y,z with a magnitude of $sqrt(x * x + y * y + z * z)$.
- What is a right handed coordinate system?

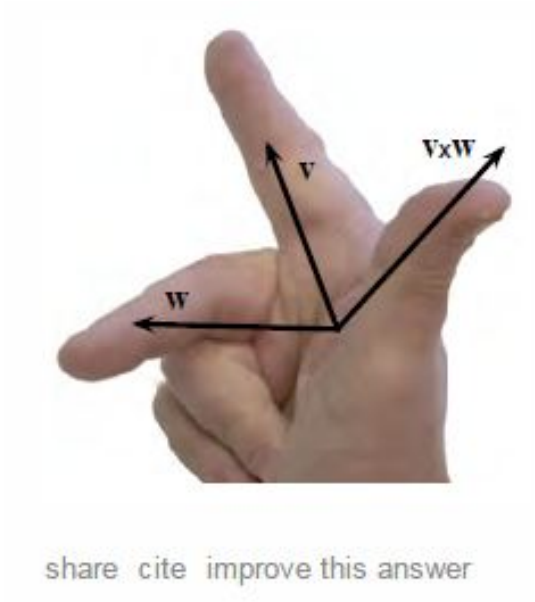

Figure 1: *right-hand coordinate system*

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Like figure 1 show a right-hand coordinate system is modelled by, wait for it, the right hand! Hold out your right hand in a fist with the thumb facing up. Stick up your thumb like your giving a thumbs up. Now extend the index finger, like your pointing at something in from of you. Finally, extend the middle finger side ways so that it's at a right-angle with the thumb and the index finger. The index finger is in the direction of the positive xx-axis, the middle finger in the direction of the positive yy-axis and the thumb the positive zz-axis. If you're in two-dimensions, chop off your thumb! (Please don't.)(e.g., [1]):
For example of Three-dimensional space like this picture Figure 2(e.g., [2]):

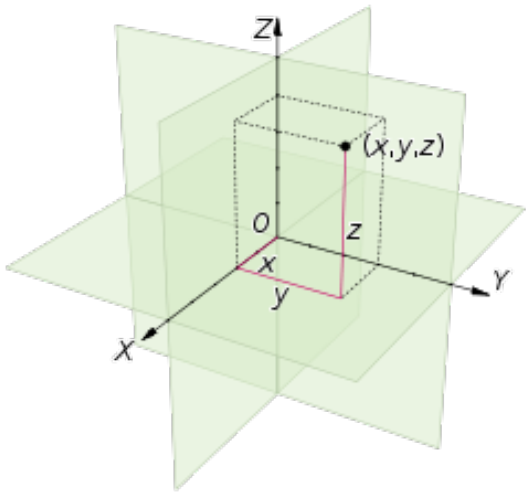

Figure 2: *Three-dimensional space*

A three dimensional Cartesian coordinate system, with origin O and axis lines X, Y and Z, oriented as shown by the arrows. The tick marks on the axes are one length unit apart. The black dot shows the point with coordinates $x = 2, y = 3$, and $z = 4$, or $(2, 3, 4)$.

$$a_1 = a_1\hat{b}$$

where a_1 is a scalar, called the scalar projection of a onto b, and $\hat{b}$is a b the unit vector in the direction of b. In turn, the scalar projection is defined as

$$a_1 = |a|\, cos\theta = a\hat{b} = a \cdot \frac{b}{|b|}$$

where the operator denotes a dot product,$|a|$ is the length of a, and θ is the angle between a and b. The scalar projection is equal to the length of the vector projection, with a minus sign if the direction of the projection is opposite to the direction of b. The vector component or vector resolute of a perpendicular to b, sometimes also called the vector rejection of a from b(e.g., [2]),is the orthogonal projection of a onto the plane (or, in general, hyperplane) orthogonal to b. Both the projection a1 and rejectiona2 of a vector a are vectors, and their sum is equal to a, which implies that the rejection is given by

$$a_2 = a - a_1$$

- How do you convert an arbitrary vector to a unit vector?

In mathematics, a unit vector in a normed vector space is a vector (often a spatial vector) of length 1. A unit vector is often denoted by a lowercase letter with a "hat": i-hat (pronounced "i-hat"). The term direction vector is used to describe a unit vector being used to represent spatial direction, and such quantities are commonly denoted as d. Two 2D direction vectors, d1 and d2 are illustrated. 2D spatial directions represented this way are equivalent numerically to points on the unit circle.
For example (3,1,1) First $3^2 + 1^2 + 1^2 = 11$ then the X Y Z divided by $\sqrt{11}$ you can unit vector is$(3/\sqrt{11}, 1/\sqrt{11}, 1/\sqrt{11})$.

- What are implicit and parametric expressions for a plane?
In mathe-matics an implicit surface is a surface in Euclidean space defined by an equation

$$F(x, y, z) = 0$$

An implicit surface is the set of zeros of a function of 3 variables. Implicit means, that the equation is not solved for x or y or z. The graph of a function is usually described by an equation z=f(x,y) and is called an explicit representation. The third essential description of a surface is the parametric one:$(x(s,t), y(s,t), z(s,t))$, where the x-, y- and z-coordinates of surface points are represented by three functions $x(s,t), y(s,t), z(s,t)$depending on common parameters s,t. The change of representations is usually simple only, when the explicit representation $z = f(x, y)$ is given:$z - f(x, y) = 0$(implicit),(s, t, f (s, t))(parametric).(e.g., [3]) Example plane$x + 2y - 3z + 1 = 0$like figure 3 :

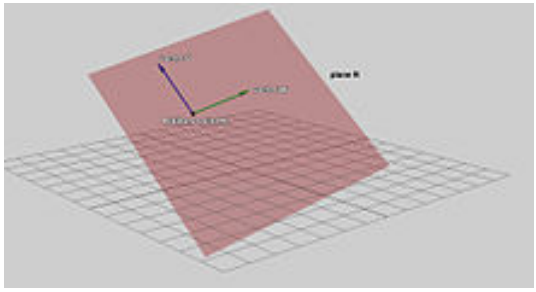

Figure 3: *plane*

2 Overview

Communication with other applications occurs through a protocol called MathLink. It allows communication between the Mathematica kernel and front-end, and also provides a general interface between the kernel and other applications. Wolfram Research freely distributes a developer kit for linking applications written in the C programming language to the Mathematica kernel through MathLink.(e.g., [4]) Using J/Link.,(e.g., [5]) a Java program can ask Mathematica to perform computations; likewise, a Mathematica program can load Java classes, manipulate Java objects and perform method calls. Similar functionality is achieved with .NET /Link,(e.g., [6])but with .NET programs instead of Java programs. Other languages that connect to Mathematica include Haskell,(e.g., [7]) AppleScript,(e.g., [8]) Racket,(e.g., [9]) Visual Basic,(e.g., [10]) Python(e.g., [11][12]) and Clojure.(e.g., [13])

Links are available to many mathematical software packages including OpenOffice.org Calc,[36] Microsoft Excel,[37] MATLAB,(e.g., [14][15][16]) R,(e.g., [17]) Sage,(e.g., [18][19]) SINGULAR,(e.g., [20]) Wolfram SystemModeler, and Origin.(e.g., [21])Mathematical equations can be exchanged with other computational or typesetting software via MathML.

Communication with SQL databases is achieved through built-in support for JDBC.(e.g., [22]) Mathematica can also install web services from a WSDL description.(e.g., [23][24]) It can access HDFS data via Hadoop.(e.g., [25])

Mathematica can capture real-time data via a link to LabVIEW,[50] from financial data feeds[51] and directly from hardware devices via GPIB (IEEE 488),(e.g., [26]) USB(e.g., [27]) and serial interfaces.(e.g., [28]) It automatically detects and reads from HID devices.

3 Conclusion

So if you want to make a scientific game, the mathematics is most important ,Coordinates in the game, the physical engine, image processing and so on are required to use it.

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