Mathematics in Everyday Life

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ABSTRACT

Mathematics is a vast topic. It is the study of topics such as quantity, structure, space and change. Mathematics is essential in many fields, such as natural science, engineering, medicine, finance and the social sciences. The origins of mathematical thought lie in the concepts of number, magnitude, and form. Maths is everywhere we go, it is all around us. Not only maths underline every process and pattern that occurs in the world around us, but also, a good understanding of it will help enormously in our everyday life. But usually mathematics is considered as a tough or boring subject. Actually it plays an important role in our daily life. Knowingly or unknowingly each and every person on this earth uses maths in his/her routine life. Our research is all about the various branches of mathematics and it's applications in everyday life. Mathematics is the backbone for many fields. It is used in various fields such as cooking, farming, astronomy, robotics, etc. In this research we have taken different branches of mathematics namely algebra, geometry, graph theory and it's applications in everyday life.

Keywords : Mathematics, Interior Design, Gameplay scripting, Graph theory

I. INTRODUCTION

ALGEBRA

Algebra is one of the broad parts of mathematics. It is the study of mathematical symbols and the rules for manipulating these symbols. It is a unifying thread of almost all of mathematics. It includes everything, from elementary equation solving to the study of abstractions such as groups, rings, and fields. Let's consider three applications of Algebra, i.e. Computer Science, Cooking and Architecture.

1.Computer Science

Algebra provides concepts that are crucial to many areas of computer science. Whenever you take a digital photo with your phone or transform the image in Photoshop, whenever you play a video game or watch a movie with digital effects, whenever you do a web search or make a phone call, you are using technologies that are built on algebra.

Areas where algebra is used in computer science:
- ✓ Network Model
- ✓ Computer Graphics
- ✓ Cryptography

2. Cooking

Use of mathematics is in every kitchen and in every recipe. The mathematics of cooking often goes unnoticed, but in reality there is a large quantity of maths skills involved in cooking and baking. It is important to understand how maths affects the quality of culinary in order to make the most delicious meals and treats. All phases of cooking require maths such as grocery shopping, baking, storing, freezing food, etc.

To be very specific, algebra is used in cooking as:

- ✓ To set temperature of oven.(in Degrees/Celsius/Fahrenheit)
- ✓ To measure the ingredients.(in teaspoons/tablespoons/cups)
- ✓ To estimate the cost of certain recipe.

3. Architecture

Algebra is used in architecture in calculating the weight and dimensions of certain buildings to make sure they are sturdy. Architects use proportions to make scale models of the structure they are designing. If it is done incorrectly, the building will not be sturdy. Mathematics and architecture are much related to each other.

Areas where algebra is used in architecture:
- ✓ Interior Design.(Floor plan for the inside of a house)
- ✓ Scale Drawing.
- ✓ Slopes.

GEOMETRY

Geometry is a branch of mathematics concerned with questions of shape, size, relative position of figures, and the properties of space. Earlier geometry was a collection of empirically discovered principles concerned with lengths, angles, areas, and volumes, which were developed to meet some practical need in surveying, construction, astronomy, and various crafts. Geometry has applications in many fields, including art, architecture, physics and chemistry. Robotics, Video game developer and Astronomy are discussed here as the areas where geometry is used.

1.Robotics

The configuration of a robotic system can rarely be described without geometry. Robot kinematics applies geometry to the study of the movement of multi-degree of freedom kinematic chains that form the structure of robotic systems.

Areas where geometry is used in robotics:
- ✓ Motion Queries, Planning and Simulation.
- ✓ Manipulation in unknown environments.
- ✓ Motion Planning and Kinematics.

2. Video Game Developer

Mathematics is everything when it comes to games. A character cannot walk up a slope, slide down a slide, fire a bullet from a gun, or even jump without the help of the mathematics. A lot of geometry in gameplay scripting is fairly simple, but geometry used in game engine architecture is far more complex and a lot more taxing mentally.

Areas where geometry is used in video games developing:
- ✓ Animation.
- ✓ Gameplay scripting.(walking, shooting, jumping)
- ✓ Game engine architecture.

3. Astronomy

Geometry is used in astronomy in many ways. It is used in astronomy to determine the properties of stars and other objects in space. It is developed to be a practical guide in measuring the velocity, area, volume and length of heavenly bodies such as stars, planets etc. The science of actually measuring positions of celestial objects in the sky is known as astrometry.

Areas where geometry is used in astronomy:
- ✓ To find the distance between the celestial objects.(such as stars and planets)
- ✓ To measure the speed and velocity of planets orbiting other stars.
- ✓ To measure angle of planets.

GRAPH THEORY

Graph theory in simple words is the study of graphs. A graph in this context is made up of vertices, nodes, or points which are connected by edges, arcs, or lines. Many practical problems can be represented by graphs. The development of technology increased the use of graph theory. In order to communicate, to operate a computer etc.

1. Electrical engineering

Graph theory is helpful in electrical engineering in various practical problems solving in circuit or Network Analysis and Data Structure. Electric network problem can be represented by drawing graphs. A graph representation of electrical network is done in terms of line segments or arc called as edges or branches and points called as vertices or terminals.

Areas in electrical engineering where graph theory is used:

- ✓ Wireless Sensor Networks.(WSN)
- ✓ Distributed Fault Detection.
- ✓ Consensus Based Systems.

2. Database Designing

Graph database uses graph structures for semantic queries with nodes, edges and properties to represent and store data. Database design is the methodology for developing the various objects that make up a database. This graph structure has key role in designing database, because it gives fast implementation process using different functionality and properties of graph structure.

Areas in database designing where graph theory is used:

- ✓ Storage system that provides index free adjacency.
- ✓ Analysing tool for interconnection.
- ✓ Powerful tool for graph like-query.

3. Image Processing

Image analysis is the methodology by which information from images is extracted. Image analysis is mainly performed on digital image processing techniques. A graph theoretic approach can be used to improve these image processing techniques. With the explosive growth in image production, in everything from digital photographs to medical scans, there has been a drastic increase in the number of applications based on digital images.

Areas in image processing where graph theory is used:

- ✓ To calculate the alignment of the picture.
- ✓ Finding distance transforms of the pixels and calculates the distance between the interior pixels by using shortest path algorithms.
- ✓ To find mathematical constraints such as entropy by using minimum spanning tree.

Let's take an example of a video game as discussed earlier and understand that where and which maths is used in it.

One operation that is very useful in video game developing is the Inverse of a matrix. A vector defines a position in space. A matrix transforms the coordinate system of a vector. When a vector is rotated or scaled, its coordinate system is transformed into a new coordinate system.

For example, if a matrix rotates a vector about the x-axis by 50 degrees. Then the matrix-inverse rotates the vector about the x-axis by -50 degrees.

Further being more specific, in Counterstrike, when you deal with a camera and a world entity. Imagine the world entity contains several buildings. To orbit about these buildings, you have two options:

a) You can orbit the camera about the centre of the world by keeping the world static
   or
b) You can rotate the world in front of the camera.

Each option is the inverse operation of the other. You can switch between one or the other by computing an inverse transformation.

II. CONCLUSION

In this research it is clearly concluded that various branches of mathematics are used widely in our day to day life whether it is cooking, gardening or playing video games. Thus mathematics expresses itself everywhere, in almost every facet of life. It is there in nature all around us and also in the technologies in our hand.

III. REFERENCES

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