The Geometry Behind Computer Science

Computational geometry is a useful tool in the field of computer science that performs calculations of geometric input and output through the use of algorithms. Emerging in the 1970s as a way to solve a 1 dimensional problem using multiple dimensions. Over the use of this concept it has also made significant contributions towards computational graph theories applied to natural geometric settings.

The first and most highly used application of this field of computer science is the depiction of both 2 dimensional and 3 dimensional graphs. This field is able to produce graphical representation of functions and is used to power various online graphical applications such as desmos, and MATLAB, a computing language and development environment that allows users, typically engineers, to analyze any 2 or 3 dimensional structure to a high degree of accuracy.
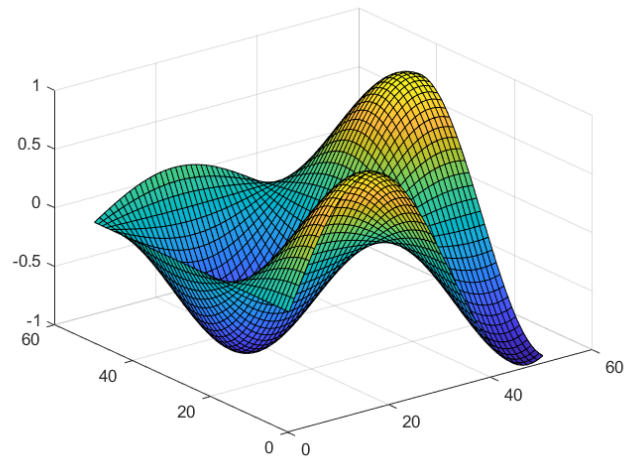
Another important application of computational geometry is the ability it has to run various testing simulations. Being able to test how aerodynamic an object is using fluid dynamics prior to the assembly of it, being able to create renders of designs and test various situations on the design as well as its structure and stability such
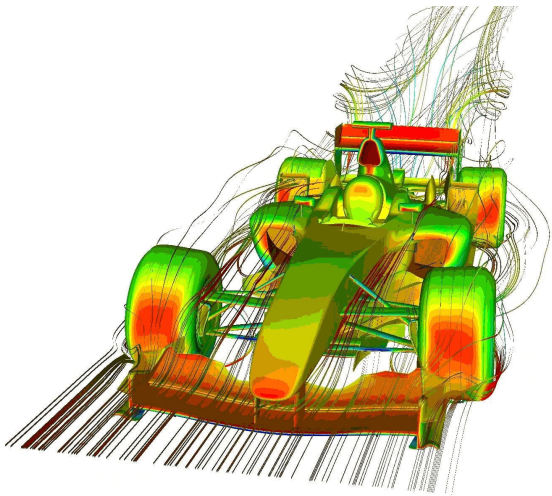
that we can predict the efficiency of a design so that we can build more accurate designs that we are more confident in prior to the assembly.

Computational geometry also has applications in artificial intelligence. Since it is the principle behind many graph theory algorithms, it is utilized for finding the shortest path in cognitive thought for AI. It is responsible for the quick and accurate decision making that AI possesses. Computational geometry is also utilized for AI through the use of convex hull algorithms for vision. Common in self-driving cars and facial recognition scans, computational geometry allows for the task to be executed with high levels of both accuracy and efficiency.

Algorithms are a large part of any computer science topic, and this is no different for computational geometry. The Convex Hull algorithm, powered by computational geometry is what is used to ensure collision avoidance whether it be in self-driving cars or in AI calculations. The Convex Hull algorithm works by taking a plot of graphed data points and creating the smallest possible enclosed convex polygon around every point, such that the shape describes where all present points are, and to ensure the avoidance of all the points and prevent a collision, then the shape must be avoided.
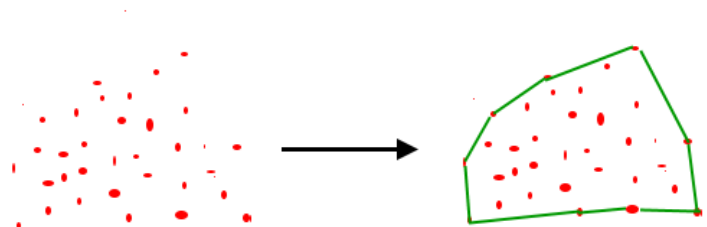
Computational geometry also finds its uses throughout networking and data science. Due to its applications across mapping algorithms and optimizing pathways, it is also able to direct the traffic of data between origin and destination to ensure that efficiency is at a maximum.

Computational geometry is a key principle to many of the various algorithms that we use on a daily basis, whether it be through AI, engineering, and more. It remains a very powerful and dominant strand of computer science that will only grow and expand in the near future with new advancements that as a programmer, I cannot wait to see.

References

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