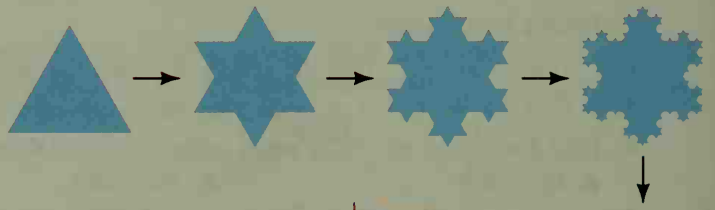
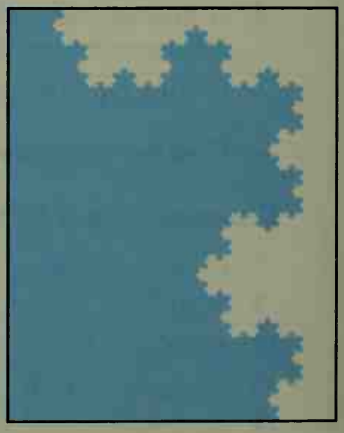
Career

Computer Animation Programmer

One problem computer animation programmers have encountered is how to produce natural-looking landscapes. The structures of trees, mountains, clouds, and coastlines are complex. To create them in a computer landscape can require storing a great deal of information. Also, since animations often include moving through space, data about the landscape features needs to be provided at many levels of detail. (If you specified the appearance of a mountain from only one viewpoint, say, then "zooming in" for a close-up would reveal that details are missing, a problem known as *loss of resolution*.)

One new approach involves using fractals. A *fractal* is a complex shape that looks more or less the same at all magnifications. Fractals are made by following simple rules, called *algorithms*. The snowflake shape in the diagram at right is an example. Its algorithm is: Start with an equilateral triangle. Divide each side of the polygon in thirds; add an equilateral triangle to each center third; repeat. No matter how much you magnify a piece of this polygon, it will retain the overall pattern and complexity of the original. When you "zoom in" on a fractal shape, there is no loss of resolution.





Computer programmers are taking advantage of this property of fractals to approximate many items in nature, such as the mountains in the photograph above. Programming a computer to follow these algorithms uses less memory than specifying the exact shape of each element from many different viewpoints and distances.