HotIce: Hands-on-tutorial for intelligent computational Evolution Part 1: Quaternions in Omnimetrics (QuO)

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(Dedicated with profound respects to Dr. J.R. Isaac, former professor of computer science, IIT, Bombay on his eighty fifth birth anniversary)

ABSTRACT

Quaternions, invented by Hamilton 1863, are extended complex numbers. A quaternion is represented by quadruple of 1 and zeros and geometrically by four axes. It surmounted the classical gimbal lock. Also, smooth rotations of 3D-objects are possible, thus circumventing hurdle of classical methods where 3D-highways lead to dead ends. Quaternion frame not only solves all earlier tasks with vector analysis, but instrumental to successfully arrive at an answer for unsolved riddles in 3D-object rotations. Rotation through 720° is achievable and finds extensive applications in proteins, missiles, space shuttles etc. Altogether, a new branch of computational mathematics grew and showed a new path in solving Schrodinger wave equation, optimizations, and nature inspired algorithms. It is a coveted tool in the armor of 21st century computational science.

Keywords: Quaternion, Complex (imaginary), Protein molecules, rotation, Schrodinger wave equation, optimization.