

Concatenation Operator for Piecewise-defined Functions

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Abstract

Piecewise-defined functions represent certain sort of mathematical arrays whose constituent elements are single functions defined over a set of fixed domains; they appear very frequently in the fields of mathematics, physics and engineering where they play an important role. The elements of this kind of functions can be properly unified, and be merged into a single plain equation, it is, concatenation. This can be done by means of the use of some kind of sigmoidal functions, where those can build a gate between each one of their elements in order to concatenate them; an example of this is the Heaviside function [1]. However sigmoidal functions do require an extra parameter of arbitrary precision to control how close can those elements be with respect to some specific point in the new merged function. This paper concerns the mathematical formulation of an operator, aimed at the concatenation of the elements of a piecewise-defined function, unifying them solely in terms of their constituent elements by themselves, and their defined fixed ranges; no extra parameter is needed for that aim. The only requirements towards the application of this operator represents: the continuity of any element of the function in the concatenation points and the existence of their limits in those points. Throughout this document it is exposed the mathematical framework from where the operator was raised from the ground, its formulation, and as well as some scenarios where its deployability is exerted.

References

1. SCHECTER STEPHEN. Step functions, delta functions, and the variation of parameters formula. Mathematics Department, North Carolina State University, http://www4.ncsu.edu/~schecter/ma_341_sp06/varpar.pdf.