cases	doc_1		doc_2		decision	id
			authors	• Toni Schneidereit • Michael BreuÃŸ	DUPLICATES	222
			title	Collocation Polynomial Neural Forms and Domain Fragmentation for solving Initial Value Problems		
			publication_date	2021-03-29 08:19:26+00:00		
			source	SupportedSources.ARXIV		
			journal	None		
			volume			
			doi			
			urls	• http://arxiv.org/pdf/2103.15413v2 • http://arxiv.org/abs/2103.15413v2 • http://arxiv.org/pdf/2103.15413v2		
			id	id16817679118748467 11		
			abstract	Several neural network approaches for solving differential equations employ trial solutions with a feedforward neural network. There are different means to incorporate the trial solution in the construction, for instance one may include them directly in the cost function. Used within the corresponding neural network, the trial solutions define the so-called neural form. Such neural forms represent general, flexible tools by which one may solve various differential equations. In this article we consider time-dependent initial value problems, which require to set up the neural form framework adequately. The neural forms presented up to now in the literature for such a setting can be considered as first order polynomials. In this work we propose to extend the polynomial order of the neural forms. The novel collocation-type construction includes several feedforward neural networks, one for each order. Additionally, we propose the fragmentation of the computational domain into subdomains. The neural forms are solved on each subdomain, whereas the interfacing grid points overlap in order to provide initial values over the whole fragmentation. We illustrate in experiments that the combination of collocation neural forms of higher order and the domain fragmentation allows to solve initial value problems over large domains with high accuracy and reliability.		
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		title	Collocation polynomial neural forms and domain fragmentation for solving initial value problems			
		publication_date	2021-03-29 00:00:00			
		source	SupportedSources.SEMANTIC_SCHOLAR			
		journal	Neural Computing and Applications			
		volume	34			
		doi	10.1007/s00521-021-06860-4			
		urls	• https://www.semanticscholar.org/paper/3350d5e28187759471c121586a81fdec603d2d36			
		id	id2853408857175441052			
		abstract	None			
		versions				