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Functional Complexity of Biological Networks

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It is now widely accepted that the complexity of the dynamical behavior of task-performing biological networks affords the latter adaptability to perform a wide variety of different tasks. Hence, understanding complexity is crucial for understanding the activity of biological systems. However, even in the context of simpler, man-made systems, complexity is still largely an intuitive blurry concept with no agreed-upon definition. In this lecture I will present new quantified observables of regularity and structural complexity that were first developed in the context of neural networks activity. I will then address the challenge of the complexity-function relationship via the introduction of a new quantified observable of functional complexity and will demonstrate that for neural networks this observable is connected with the capacity for information storage.