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High-performance computing in the era of genomics

Recent advances in DNA sequencing technology and high throughput computation have revolutionised the field of biology. In modern biology, DNA strands that contain the recipe for making an organism are considered as long strings of coded data that need to be treated in the same way as multi-dimensional data in computer science. The scale of data that biologists need to analyse confronts them with a new set of challenges, for which most of them have not received adequate training. In this presentation, I demonstrate some of the HPC pipelines used by the Centre for Ecological Genomics and Wildlife Conservation to assemble genomic data, reconstruct evolutionary relationships between organisms, and investigate the functional significance of biological data. Having access to HPC resources in South Africa is helping the country's biologists to overcome these challenges and enter a new era in the biological science. We advocate for a close and multidisciplinary collaboration between biologists, computer scientists and other stakeholders to better prepare academia for a smooth transition into the new era. Such collaboration will have positive impacts on the country's economy, public health and ecological diversity that goes beyond the field of biology.

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