Bioinformatics in Plant Sciences: A model for training the next generation of data-enabled/fluent scientists

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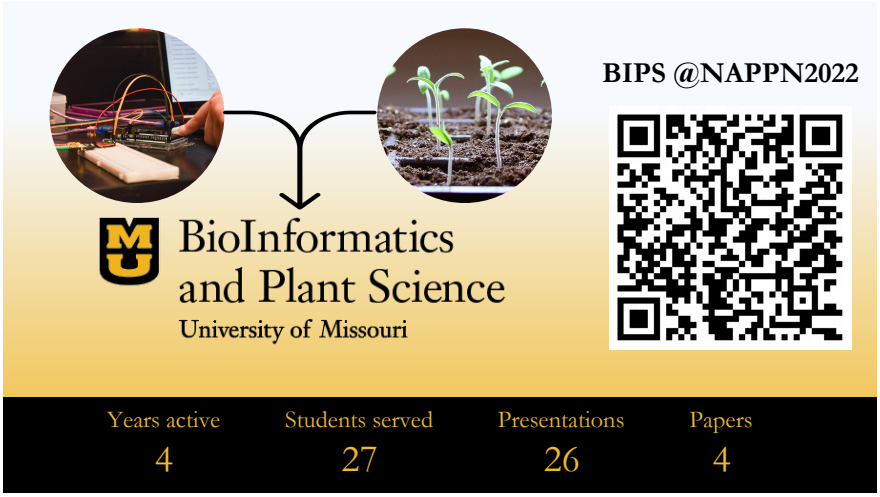
Abstract

Generating data has become cheaper and easier, but alone is not sufficient to answer biological questions – data must be analyzed and interpreted. However, many algorithms can create or exacerbate biases (e.g., facial-recognition, ancestry, and disease risk). This necessitates incorporating diverse perspectives to confront both the moral and technical "big data challenges". To move to a future where this is possible, it is necessary for researchers to develop skills in data management, processing, and analytics. Specifically, the field of plant phenotyping has moved from time consuming hand measurements to the use and development of high-throughput phenotyping. These systems require data-enabled/fluent users, yet academic programs in biology do not provide sufficient data science training. Here we present the Bioinformatics in Plant Science (BIPS) program at the University of Missouri (MU) as a model for training the next generation of data-enabled/fluent scientists. BIPS aims to mentor undergraduate students to build foundational skills in plant biology, research, and computational science. Our program pairs biology and computer science students to address biological questions through computational methods, with many focusing on plant phenotyping methods. The students learn to tackle problems using multidisciplinary approaches, alongside learning how to work in teams while building science communication skills (e.g., professional conferences, research forums, presenting to lawmakers). Through peer learning, BIPS students can understand and incorporate diverse perspectives from both the biological and computational side to address one of NSF's 10 big ideas: harnessing the data revolution.



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