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Software: The Utility of CDK9 Inhibitors for Restricting Bladder and Cervical Cancers in Human and Dog

Benchmark software provides an unbiased platform using real-life experimental data to rigorously assess and optimize biological pathway analysis tools for accurate pathway discovery.

Researchers at Purdue University have developed a software termed Benchmark that evaluates the performance of existing pathway analysis tools from large-scale biological data. Biological pathway analysis tools are critical for identifying relevant and dysregulated pathways. However, current techniques, such as in silico methods, produce hypothesized pathways that are not the most salient among the pathways returned by the analyses. The dearth of suitable evaluation platforms based on large-scale experimental data significantly impedes informed pathway analysis tool deployment and hinders blinded discovery of cancer perturbations.

This technology helps scientists and biotechnology companies explicitly assess the performance of many common pathway analysis tools in identifying and ranking correct biological pathways. The software identifies optimal settings and best practices for highly accurate and unbiased pathway discovery methods from high-volume experimental datasets. Free from systematic biases notoriously introduced by computer simulations, this software provides a legitimate readout of pathway analysis tool performance under real-life settings.

Technology Validation:

Using Benchmark, the researchers evaluated the performance of 11 different pathway analysis tools and compared three ranking statistics for 126 pathway analysis methods. The median rank of the correct pathway returned by each method was determined. The researchers found that commonly used pathway analysis tools consistently underperformed as they are not optimal for unbiased and systematic discovery of the most disrupted pathway, even after extensive optimization.

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Category
Biotechnology & Life Sciences/Biomarker Discovery & Diagnostics
Biotechnology & Life Sciences/Bioinformatics & Computational Biology
Pharmaceuticals/Drug Discovery & Development
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation
Pharmaceuticals/Computational & Software Tools

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Advantages:

-Gathers information from large numbers (~1000) of experimental datasets

-Eliminates systematic biases introduced by computer stimulations

-Contains noise inherent to biological data and provides a platform for a legitimate readout of the performance of pathway analysis tools under real-life settings

Applications:

-Biotechnology companies

-Scientists

TRL: 4

Intellectual Property:

N/A, N/A, N/A

Keywords: Benchmark software, pathway analysis tools, biological data evaluation, dysregulated pathways, cancer perturbations, high-volume experimental datasets, pathway discovery methods, biotechnology, scientists, tool performance assessment