

CisCross web server: a gene set enrichment analysis to predict the upstream regulators in *Arabidopsis thaliana*

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It is supposed that co-expressed genes are controlled by common transcription factors (TFs), which could be predicted by the enrichment analysis of their binding loci in promoters of these genes. Recently, a high-throughput DNA affinity purification followed by sequencing (DAP-Seq) method was used to generate the collection of the binding profiles for 387 *Arabidopsis thaliana* TFs (Plant Cistrome). In our work, we aim to improve the results of the gene set enrichment analysis by creating alternative collections of peak sets via re-processing of raw DAP-Seq data and getting a better quality of peak sets. We implemented gene set enrichment analysis using new collections of peak sets as CisCross web server. CisCross is capable of defining potential target genes of TFs with respect to upstream regions of different length and visualizing the corresponding TF binding loci. Using several different gene expression profiles, we demonstrated that CisCross flexibility ensures accurate data analysis and potentiates a deeper insight into the mechanisms of gene transcription regulation compared with other web-applications. This work was supported by the RSF 21-14-00240.

The main publications of authors on the subject of the abstract:

Lavrekha, V.V., Levitsky, V., Tsukanov, A.V., Bogomolov, A.G., Grigorovich, D.A., Omelyanchuk, N., Zemlyanskaya, E.V. and Mironova, V. (2022). CisCross: A gene list enrichment analysis to predict upstream regulators in *Arabidopsis thaliana* // *Front. Plant Sci.* 13, 942710. doi: 10.3389/fpls.2022.942710.

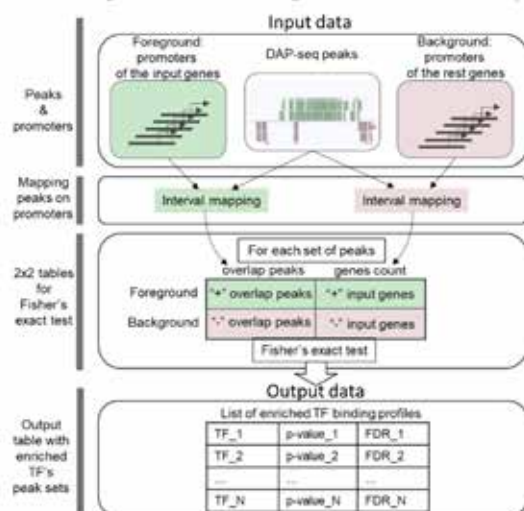
Take-home message:

The CisCross (<https://plamorph.sysbio.ru/ciscross/>) is a flexible tool for prediction of the upstream transcriptional regulators in *A. thaliana* gene sets, which provides a whole spectrum of settings, including alternative collections of peak sets.

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CisCross algorithm scheme of a gene set enrichment analysis



Example of the output data for the CisCross web server

