

Web-MCOT server for motifs co-occurrence search in ChIP-seq data

Levitsky V.^{1,2*}, Mukhin A.¹, Oshchepkov D.¹, Zemlyanskaya E.^{1,2}, Lashin S.^{1,2}

¹ *Institute of Cytology and Genetics, SB RAS, Novosibirsk, Russia*

² *Novosibirsk State University, Novosibirsk, Russia*

* levitsky@bionet.nsc.ru

A DNA sequence element possessing transcriptional regulatory activity typically consists of multiple binding sites of several TFs. The analysis of massive ChIP-seq data provides the lists of overrepresented motifs usually interpreted as potential binding sites of TFs. Since commonly TFs bind DNA cooperatively, the first step in this analysis is the search of enriched co-occurred motifs. Here we present the web server Motifs Co-Occurrence Tool (Web-MCOT) that for a single ChIP-seq dataset detects the composite elements (CEs) or overrepresented homo- and heterotypic pairs of motifs with spacers and overlaps, with any mutual orientations, uncovering various similarities to recognition models within pairs of motifs. The first (Anchor) motif in CEs respects the target transcription factor of ChIP-seq experiment, while the second one (Partner) can be defined either by a user or a public library of partner motifs is processed. The public libraries of motifs for TFs of human/mouse and plants can be applied in analysis. The web server tests the significance of motifs similarity to filter out possible false predictions related with a significant match between the Anchor and Partner motifs. Web-MCOT computes significances of CEs without reference to motifs conservation, including separate analysis of CEs with overlaps of motifs and those with spacers. The web server computes the significances of CEs with more conserved Partner and Anchor motifs. Graphic results show histograms of CEs abundance depending on orientations of motifs, their full or partial overlap and spacer lengths. For each pair of Anchor and Partner motifs the web server shows the logo of the most common CE structural type with an overlap of motifs, and heatmaps depicting abundance of CEs with one motif possessing higher conservation than another. Additionally, the web interface allows sorting of CEs with partner motifs of different TFs according to the significance of the co-occurrence. Web-MCOT is available at <https://webmcot.sysbio.cytogen.ru/> and <https://webmcot-euro.sysbio.cytogen.ru/>.

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