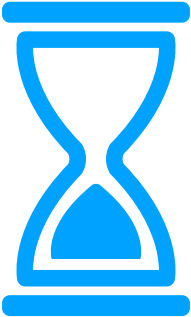


Time complexity



Theorem 2 (Bates, Candès, Janson and **Wang**, 2019, *informal version*)

If an algorithm samples exact knockoff for any distribution with only access to evaluating the distribution's unnormalized density Φ , then almost surely,

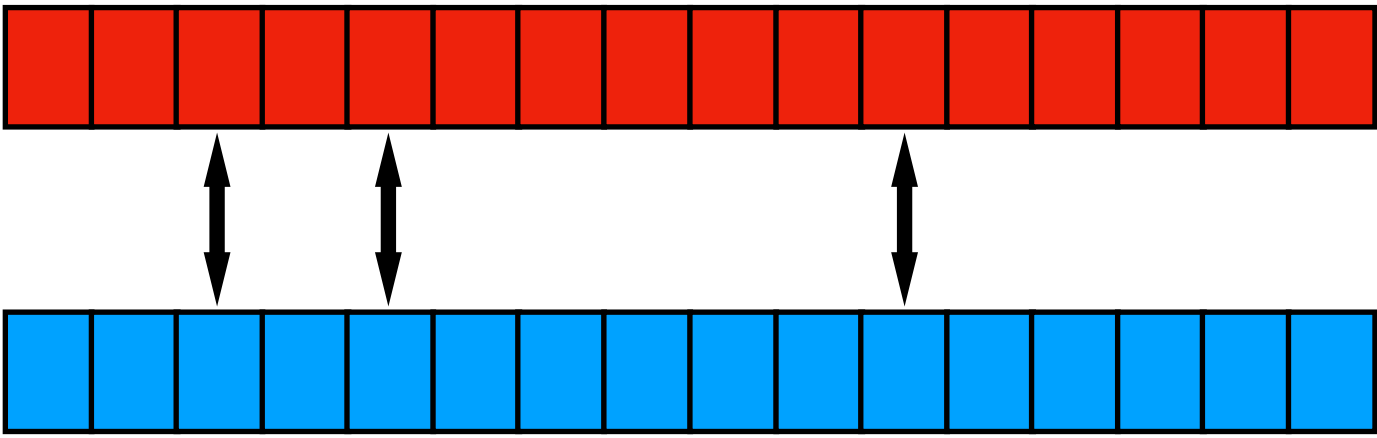
$$\text{number of evaluations of the density} \geq 2^{|\{j: X_j \neq \tilde{X}_j\}|} - 1$$

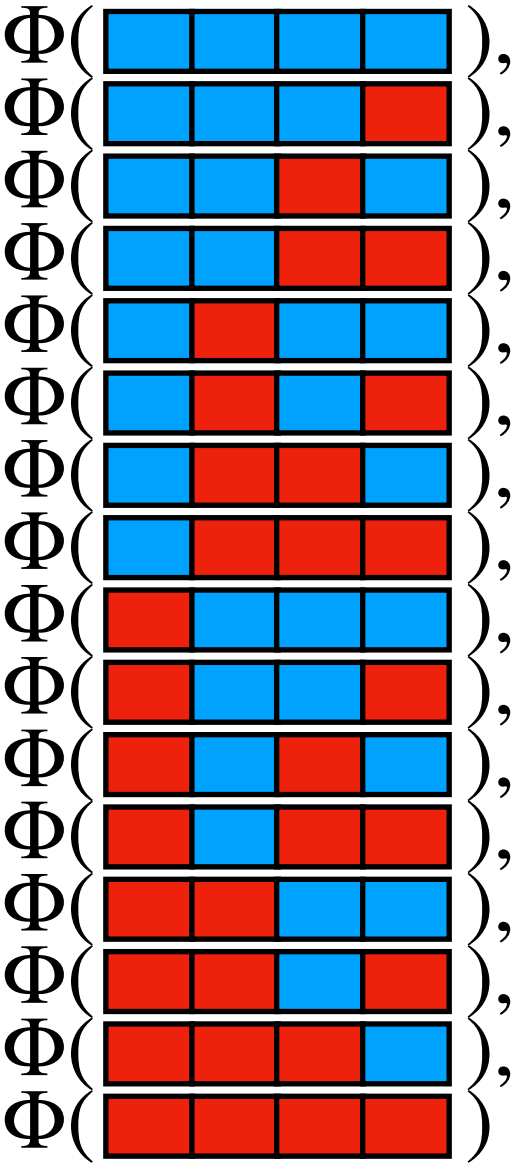
number of swapping operations

is exponential in p

need density at all points of the form

(Z_1, Z_2, \dots, Z_p) , Z_j equal to X_j or \tilde{X}_j





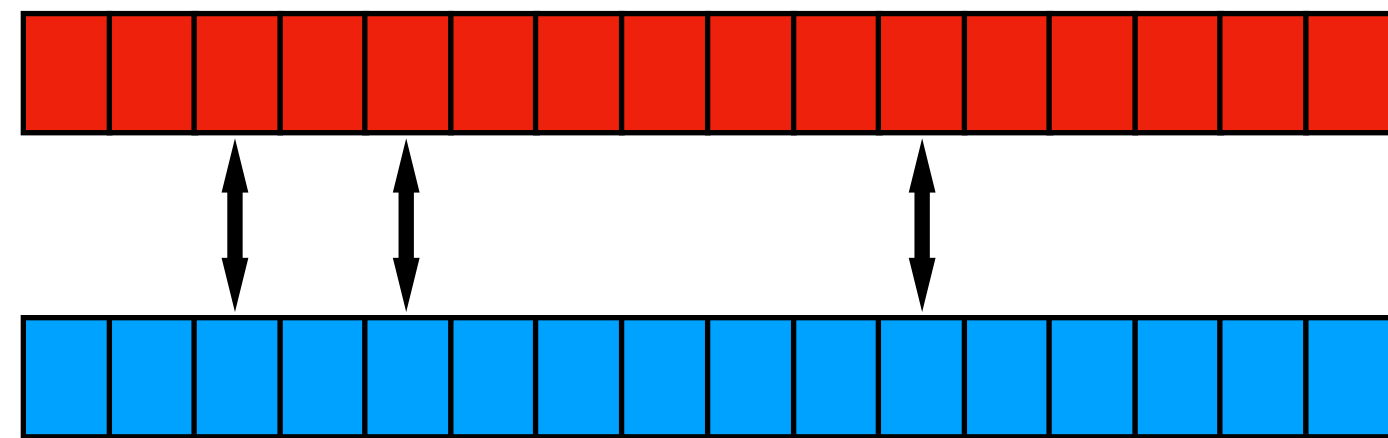
$p = 4, 2^4 = 16$
combinations

Time complexity

Theorem 2 (Bates, Candès, Janson and **Wang**, 2019, *informal version*)

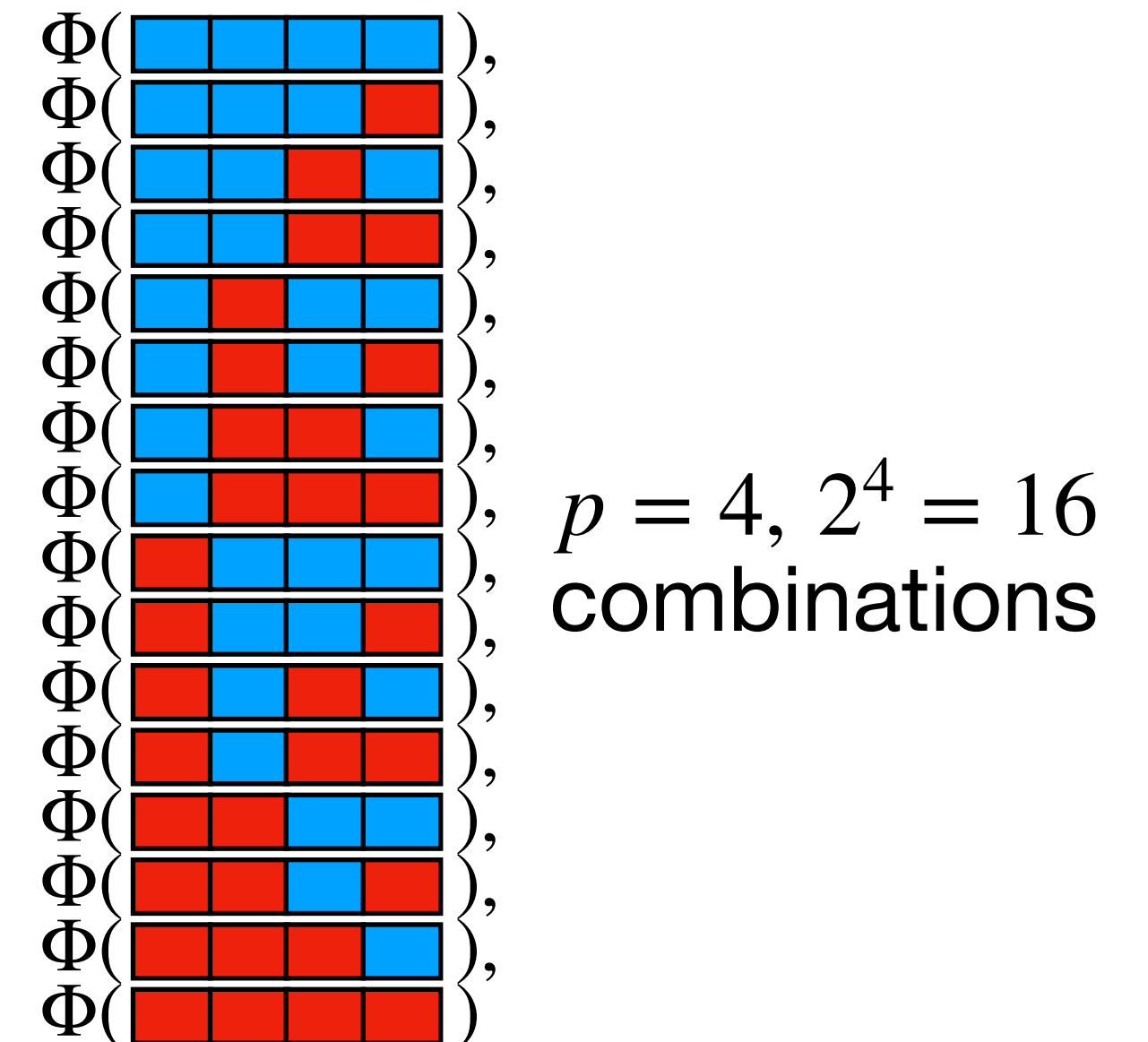
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Theorem 2 (Bates, Candès, Janson and **Wang**, 2019, *informal version*)

If an algorithm samples **exact** knockoff for **any** distribution with only access to evaluating the distribution's unnormalized density Φ , then almost surely,

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