Gan2014 (MOAT, Morris One-At-a-Time)

MOAT screening is a typical One-At-a-Time (OAT) method for parameter screening ([Morris, 1991](https://www.sciencedirect.com/science/article/pii/S1364815213002338" \l "bib42)). Theoretic basis of this method is that the overall effect and interaction effect of each parameter can be approximated by the mean μ and standard deviation σ of the gradients of each parameter sampled from r MOAT paths. [Campolongo et al. (2007)](https://www.sciencedirect.com/science/article/pii/S1364815213002338" \l "bib14) proposed a modified mean μ∗, which is an estimate of the mean of absolute gradients, to solve the problem of the effects of opposite signs in gradients. We use the modified mean μ∗ (denoted as MOAT-1) and standard deviation σ (denoted as MOAT-2) as the MOAT sensitivity measures.

As for MOAT sampling, range of each parameter is partitioned into p−1 equal intervals, thus the parameter space is an n-dimension p-level orthogonal grid, where each parameter can take on values from these p predetermined values. First, r points (r × n sample matrix M0, each row is a n-dimension sample point) are randomly generated from the orthogonal grid; and then, for each of the r points, other sample points are generated by perturbing one dimension at a time under a p/[2 × (p−1)] space step until all the n dimensions have been varied for only one time. Therefore, total sample points will be (n + 1) × r.

Herman2013

« Morris, a screening-based sensitivity approach, to provide results sufficiently similar to those of the Sobol method at a greatly reduced computational expense.”

The method of Morris (1991) measures global sensitivity using a set of local derivatives (elementary effects) taken at points sampled throughout the parameter space. The method of Morris can estimate parameter interactions by considering both the mean and variance of the elementary effects.