

Parameter optimisation with accuracy control

Erik Hide Sæternes

Simula Research Laboratory

simula

E. H. Sæternes, A. Thune, A. B. Rustad, T. Skeie, and X. Cai. “Automated parameter tuning with accuracy control for efficient reservoir simulations”. In: Journal of Computational Science 75 (2024). <https://doi.org/10.1016/j.jocs.2023.102205>

simula

$$p^* = \arg \min_{p \in P} \mu(p)$$

$$\mu(p) = \text{time?}$$

$$p^* = \arg \min_{p \in P} \mu(p)$$

$$\mu(p) = I_N(p) + \alpha I_L(p)$$

$I_N(\cdot)$ = Number of Newton iterations

$I_L(\cdot)$ = Number of linear iterations

Searching

$$p^* = \arg \min_{p \in P} \mu(p)$$

- Initial parameter values
- Perturb stochastically
- Gradient-based search step
- Look for improvement
- Repeat

Accuracy control

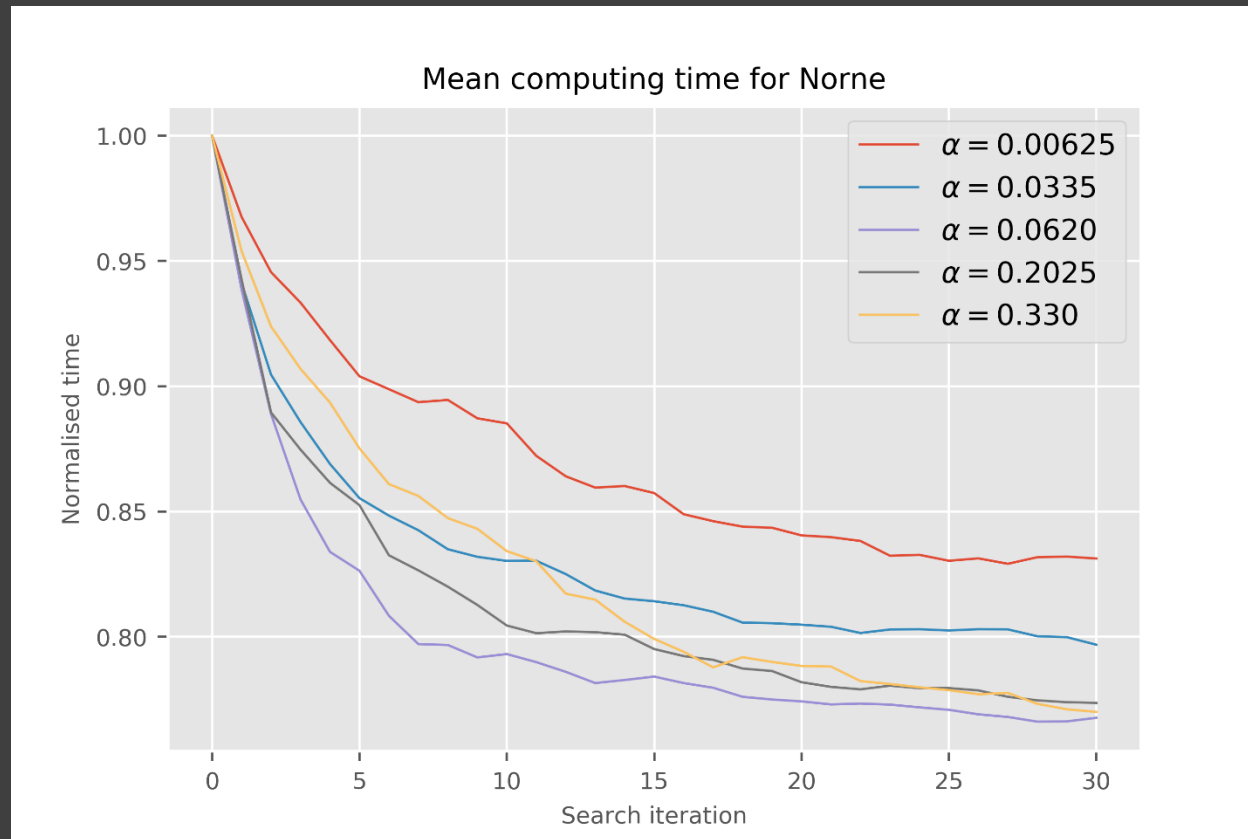
WBHP (i.e. well bottom-hole pressure)

Arrays of pressure values

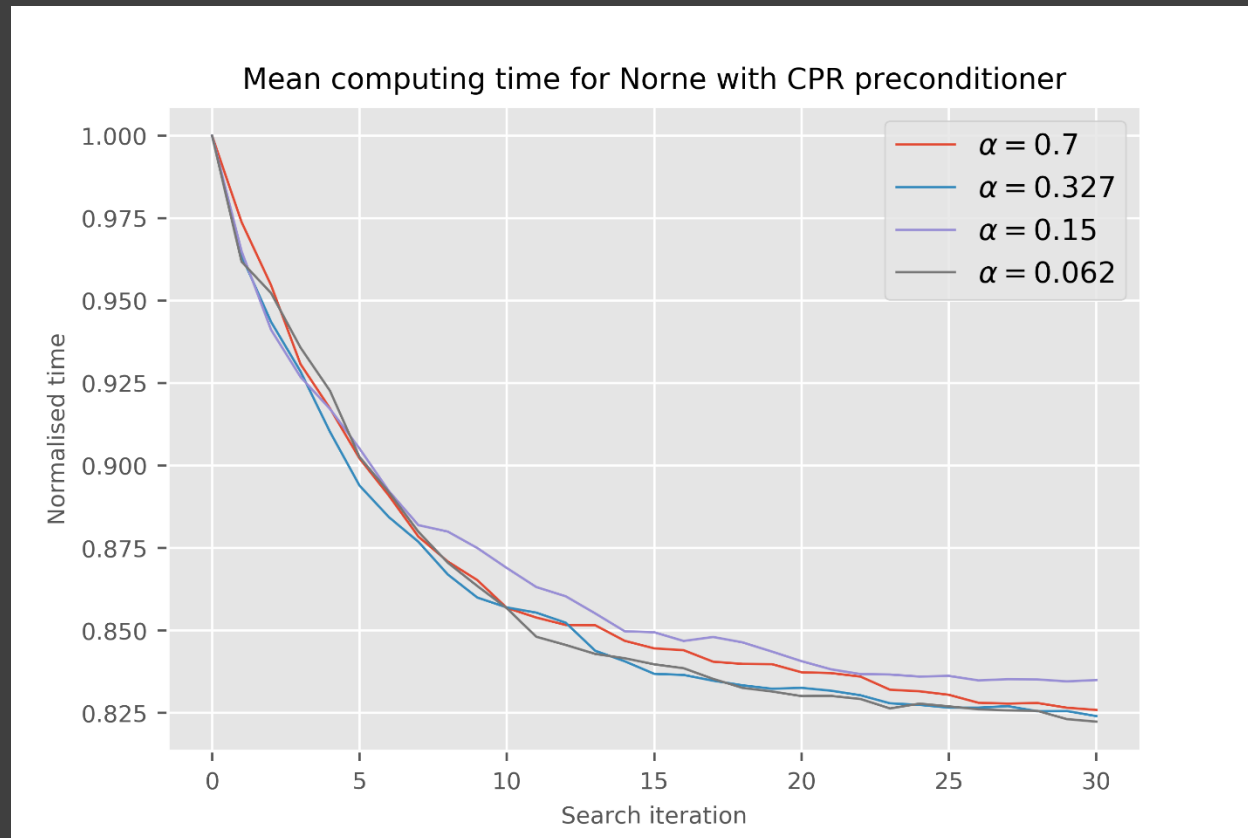
Accuracy control

- Correlation
- Cosine similarity
- Euclidean distance
- Relative Euclidean distance
- Jensen–Shannon divergence

Results



Results



Results

