

# Advantages and drawbacks

- Extremely fast there exists  $C, \rho > 0$  such that

$$\|x_t - x^*\|^2 \leq C e^{-\rho 2^t}.$$

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- Computationally expensive: requires  $\sim n^3$  operations to compute the inverse of the  $n \times n$  matrix  $H_f(x_t)$ .
- In non-convex setting, Newton's method gets attracted by any critical points (which could be saddle points/maximas...).

**Quasi-Newton methods:** try to approximate  $H_f(x_t)$  by matrices  $B_t$  that are easier to compute.

$$x_{t+1} = x_t - B_t^{-1} \nabla f(x_t)$$