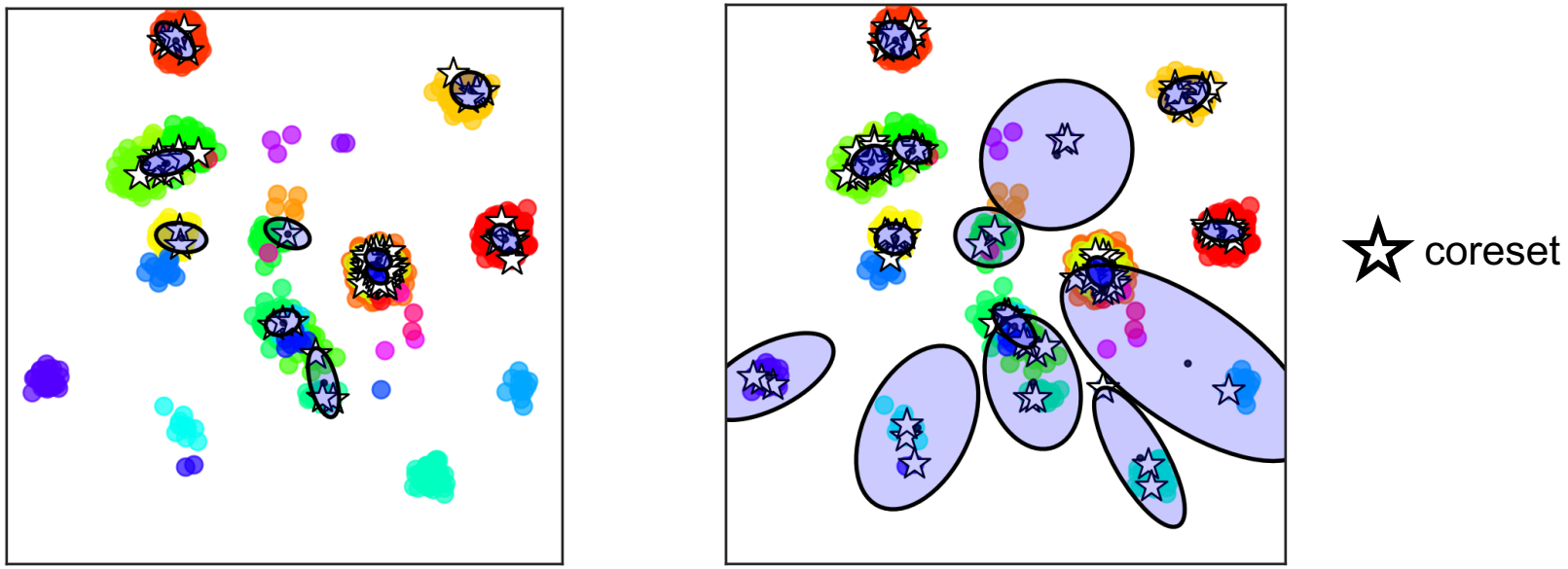
Variational Inference for DPGMM with Coresets

Zalán Borsos, Olivier Bachem, Andreas Krause

- *goal*: scaling up **posterior inference** via **coresets**

$$|\mathrm{cost}(\mathbf{X}, \mathbf{Q}) - \mathrm{cost}(\mathbf{C}, \mathbf{Q})| \leq \varepsilon \mathrm{cost}(\mathbf{X}, \mathbf{Q}), \quad \forall \mathbf{Q}$$

data coreset query



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- in case of VI: $\mathrm{cost}(\mathbf{X}, \mathbf{Q}) := \mathrm{ELBO}_q(\mathbf{X})$

😕

$$|\mathrm{cost}(\mathbf{X}, \mathbf{Q}) - \mathrm{cost}(\mathbf{C}, \mathbf{Q})| \leq \varepsilon \mathrm{cost}(\mathbf{X}, \mathbf{Q})$$

🙂

$$|\mathrm{cost}(\mathbf{X}, \mathbf{Q}) - \mathrm{cost}(\mathbf{C}, \mathbf{Q})| \leq \varepsilon \mathrm{cost}(\mathbf{X}, \mathbf{Q}) + \underbrace{\varepsilon f(\mathbf{X}, \mathbf{\Sigma})}_{\text{additive term}}$$

- *contribution:* one **simple alg.** for coresets construction in Bayesian GMM and Dirichlet Process GMM

1000x speedup
vs.
10% error