

Bootstrap for empirical barycenters

Let $\mathcal{P}_2(\mathbb{R}^d)$ be a space of probability measures with finite second moment, endowed with 2-Wasserstein distance. Let \mathbb{P} be a measure supported on a subset of $\mathcal{A} \subset \mathcal{P}_2(\mathbb{R}^d)$, \mathcal{A} is a set of measures with continuous density functions. Let ν_1, \dots, ν_n be a set of n iid sample from \mathbb{P} . Population and empirical barycenters [AGU11] are

$$\mu^* \stackrel{\text{def}}{=} \operatorname{arginf}_{\mu \in \mathcal{P}_2(\mathbb{R}^d)} \int_{\mathcal{A}} W_2^2(\nu, \mu) \mathbb{P}(d\nu), \quad \mu_n \stackrel{\text{def}}{=} \operatorname{arginf}_{\mu \in \mathcal{P}_2(\mathbb{R}^d)} \frac{1}{n} \sum_{i=1}^n W_2^2(\nu_i, \mu)$$

respectively.

Workpackages:

1. Estimate the rate of convergence $W_2^2(\mu^*, \mu_n)$;
2. Construct non-asymptotic confidence sets around μ_n using multiplier bootstrap [EBE17];
3. application to detection of structural breaks in a flow of images

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Literature

[AGU11] Agueh, Martial, and Guillaume Carlier. "Barycenters in the Wasserstein space." *SIAM Journal on Mathematical Analysis* 43.2 (2011): 904–924.

[EBE17] Ebert, Johannes, Vladimir Spokoiny, and Alexandra Suvorikova. "Construction of Non-asymptotic Confidence Sets in 2-Wasserstein Space." *arXiv preprint arXiv:1703.03658* (2017).