

# Convergence theorems for barycentric maps

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## Abstract

I first explain a theory of conditional expectations for random variables with values in a complete metric space  $M$  equipped with a contractive barycentric map  $\beta$ , and then give convergence theorems for martingales of  $\beta$ -conditional expectations. I give the Birkhoff ergodic theorem for  $\beta$ -values of ergodic empirical measures and provide a description of the ergodic limit function in terms of the  $\beta$ -conditional expectation. Moreover, I prove the continuity property of the ergodic limit function by finding a complete metric between contractive barycentric maps on the Wasserstein space of Borel probability measures on  $M$ . Finally, the large deviation property of  $\beta$ -values of i.i.d. empirical measures is obtained by applying the Sanov large deviation principle.

This is joint work with Yongdo Lim.

- [1] F. Hiai and Y. Lim, Convergence theorems for barycentric maps, Preprint, arXiv:1805.08558 [math.PR].