Stochastic Amplitude Flow for Phase Retrieval and Ptychography

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We consider Stochastic Amplitude Flow (SAF) for phase retrieval [1, 2], a stochastic gradient descent for the amplitude-based squared loss. While the convergence to a critical point of (nonstochastic) Amplitude Flow is well-understood, SAF is a much less studied algorithm. We close this gap by deriving the convergence guarantees for SAF based on the contributions for Amplitude Flow and analysis for stochastic gradient descent. These results are then applied to two more algorithms, which can be seen as instances of SAF. The first is an extension of the Kaczmarz method for phase retrieval [5]. The second is Ptychographic Iterative Engine [4], which is a popular algorithm for ptychography [3], a special case of phase retrieval with the short-time Fourier transform.

It is based on our preprint [6].

References

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