User-friendly Building of Reconstruction Algorithms with GlobalBioIm

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Abstract

The current shift towards computational imaging has made reconstruction procedures an integral part of many advanced imaging systems. A consequence is that imaging scientists now commonly require efficient and reliable computational tools for solving their inverse problems.

To this end, we recently developed *GlobalBioIm*, an open-source Matlab library that standardizes the resolution of a wide range of imaging problems [1]. This toolbox gives access to cutting-edge reconstruction algorithms, and can be extended to new modalities and methods by combining elementary modules. The versatility and efficiency of *GlobalBioIm* have been highlighted in a series of recent high-impact works [2-4].

Driven by these encouraging applications, we have devoted our efforts towards improving the usability of *GlobalBioIm* by those with limited expertise in inverse problems and optimization theory. The outcome is a new user-friendly Matlab interface (Figure 1) that allows non-experts to intuitively build tailored reconstruction algorithms with minimal effort.

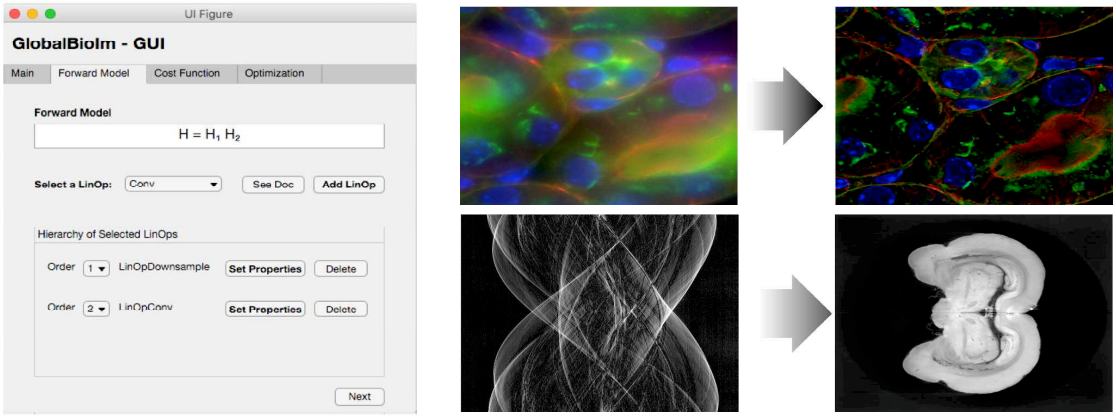

Figure 1: The new GlobalBioIm GUI (left) can be used to solve various inverse problems (right).

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[3] C. Chen et al, *Imaging neural activity in the ventral nerve cord of […] Drosophilia*, Nature Communications, 2018

[4] E. Soubies et al, *Nanometric axial resolution of fibronectin […] with multi-angle-TIRF*, Nature Sci. Reports, 2019