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	authors	<ul style="list-style-type: none"><li>Haimiao Zhang</li><li>Bin Dong</li></ul>	authors	<ul style="list-style-type: none"><li>Dong, Bin</li><li>Zhang, Haimiao</li></ul>		
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	abstract	Medical imaging is crucial in modern clinics to guide the diagnosis and treatment of diseases. Medical image reconstruction is one of the most fundamental and important components of medical imaging, whose major objective is to acquire high-quality medical images for clinical usage at the minimal cost and risk to the patients. Mathematical models in medical image reconstruction or, more generally, image restoration in computer vision, have been playing a prominent role. Earlier mathematical models are mostly designed by human knowledge or hypothesis on the image to be reconstructed, and we shall call these models handcrafted models. Later, handcrafted plus data-driven modeling started to emerge which still mostly relies on human designs, while part of the model is learned from the observed data. More recently, as more data and computation resources are made available, deep learning based models (or deep models) pushed the data-driven modeling to the extreme where the models are mostly based on learning with minimal human designs. Both handcrafted and data-driven modeling have their own advantages and disadvantages. One of the major research trends in medical imaging is to combine handcrafted modeling with deep modeling so that we can enjoy benefits from both approaches. The major part of this article is to provide a conceptual review of some recent works on deep modeling from the unrolling dynamics viewpoint. This viewpoint stimulates new designs of neural network architectures with inspirations from optimization algorithms and numerical differential equations. Given the popularity of deep modeling, there are still vast remaining challenges in the field, as well as opportunities which we shall discuss at the end of this article.	abstract	Medical imaging is crucial in modern clinics to guide the diagnosis and treatment of diseases. Medical image reconstruction is one of the most fundamental and important components of medical imaging, whose major objective is to acquire high-quality medical images for clinical usage at the minimal cost and risk to the patients. Mathematical models in medical image reconstruction or, more generally, image restoration in computer vision, have been playing a prominent role. Earlier mathematical models are mostly designed by human knowledge or hypothesis on the image to be reconstructed, and we shall call these models handcrafted models. Later, handcrafted plus data-driven modeling started to emerge which still mostly relies on human designs, while part of the model is learned from the observed data. More recently, as more data and computation resources are made available, deep learning based models (or deep models) pushed the data-driven modeling to the extreme where the models are mostly based on learning with minimal human designs. Both handcrafted and data-driven modeling have their own advantages and disadvantages. One of the major research trends in medical imaging is to combine handcrafted modeling with deep modeling so that we can enjoy benefits from both approaches. The major part of this article is to provide a conceptual review of some recent works on deep modeling from the unrolling dynamics viewpoint. This viewpoint stimulates new designs of neural network architectures with inspirations from optimization algorithms and numerical differential equations. Given the popularity of deep modeling, there are still vast remaining challenges in the field, as well as opportunities which we shall discuss at the end of this article.Comment: 31 pages, 6 figures. Survey pape		
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