Musculoskeletal injuries are the most common healthcare problem in the United States. Many guidelines lack explicit evidence-based recommendation for treating/preventing various musculoskeletal injuries and disorders. One of the reasons is that current diagnosis and evaluation methods used in the clinical and industrial settings may not be able to accurately detect critical kinematic changes associated with these injuries and reliably quantify the joint stress associated with realistic job tasks. Digital imaging technologies are becoming more and more accessible in clinical and industrial settings and enable accurate and fast characterization of in vivo joint kinematics in the clinical and industrial environment. This presentation will discuss some of the cutting edge research utilizing computer vision and medical imaging for musculoskeletal system evaluation and demonstrates how advanced methods integrating medical imaging, optimization, and motion analysis can improve the understanding of musculoskeletal injuries.