Spinal Cord Toolbox (SCT)

https://spinalcordtoolbox.com/

Clinicians often have difficulty predicting patient Degenerative cervical myelopathy outcome. Automated tools, such as the Spinal Cord Toolbox (SCT), show promise, but remain in the early stages of development.

De Leener et al. introduced the Spinal Cord Toolbox (SCT), a comprehensive software dedicated to the processing of spinal cord MRI data. SCT builds on previously-validated methods and includes state-of-the-art MRI templates and atlases of the spinal cord, algorithms to segment and register new data to the templates, and motion correction methods for diffusion and functional time series. SCT is tailored towards standardization and automation of the processing pipeline, versatility, modularity, and it follows guidelines of software development and distribution. Preliminary applications of SCT cover a variety of studies, from cross-sectional area measures in large databases of patients, to the precise quantification of mpMRI metrics in specific spinal pathways. They anticipated that SCT will bring together the spinal cord neuroimaging community by establishing standard templates and analysis procedures ¹⁾

To evaluate the current state of an SCT automated process, Ost et al. applied it to MR imaging records from 328 DCM patients, using the modified Japanese Orthopedic Associate scale as a measure of Degenerative cervical myelopathy severity. They found that the metrics extracted from these automated methods are insufficient to reliably predict disease severity. Such automated processes showed potential, however, by highlighting trends and barriers which future analyses could, with time, overcome. This, paired with findings from other studies with similar processes, suggests that additional non-imaging metrics could be added to achieve diagnostically relevant predictions. Although modeling techniques such as these are still in their infancy, future models of DCM severity could greatly improve automated clinical diagnosis, communications with patients, and patient outcomes²⁾

1)

De Leener B, Lévy S, Dupont SM, Fonov VS, Stikov N, Louis Collins D, Callot V, Cohen-Adad J. SCT: Spinal Cord Toolbox, an open-source software for processing spinal cord MRI data. Neuroimage. 2017 Jan 15;145(Pt A):24-43. doi: 10.1016/j.neuroimage.2016.10.009. Epub 2016 Oct 5. PMID: 27720818.

Ost K, Jacobs WB, Evaniew N, Cohen-Adad J, Anderson D, Cadotte DW. Spinal Cord Morphology in Degenerative Cervical Myelopathy Patients; Assessing Key Morphological Characteristics Using Machine Vision Tools. J Clin Med. 2021 Feb 23;10(4):892. doi: 10.3390/jcm10040892. PMID: 33672259; PMCID: PMC7926672.

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