

AOGMMeasure

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This web page supplements the paper entitled Cell Tracking Accuracy Measurement Based on Comparison of Acyclic Oriented Graphs. The paper provides a rigorous mathematical description and an extensive behavior analysis of a cell tracking accuracy measure, a prototype of which has continuously been used in the individual editions of the Cell Tracking Challenge. The measure is based on acyclic oriented graphs matching, thus abbreviated as AOGM measure.

Tracking motile cells in time-lapse series is challenging and is required in many biomedical applications. Cell tracks can be mathematically represented as acyclic oriented graphs. Their vertices describe the spatio-temporal locations of individual cells, whereas the edges represent temporal relationships between them. Such a representation maintains the knowledge of all important cellular events within a captured field of view. The AOGM measure assumes the existence of a ground-truth reference, and assesses how difficult it is to transform a computed graph into the reference one. The difficulty is measured as a weighted sum of the lowest number of graph operations, such as split, delete, and add a vertex and delete, add, and alter the semantics of an edge, needed to make the graphs identical. As the measure penalizes all possible errors in the tracking results and is easy to compute, it may especially help developers and analysts to tune their algorithms according to their needs.

The implementation of the AOGM measure is made publicly available in the form of a 32-bit standalone console application for the machines running Windows 7 or later. The application is provided free of charge for noncommercial and research purposes. Its use for any other purpose is generally possible, but solely with the explicit permission of the authors. In case of any questions, please do not hesitate to contact us at pam@fi.muni.cz or xmaska@fi.muni.cz.

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