Automated detection of circulating tumor cells with naive Bayesian classifiers.

Svensson C-M, Krusekopf S, Lücke J, Figge MT (2014) Automated detection of circulating tumor cells with naive Bayesian classifiers. *Cytometry A* 85(6), 501-511.

Abstract

Personalized medicine is a modern healthcare approach where information on each person's unique clinical constitution is exploited to realize early disease intervention based on more informed medical decisions. The application of diagnostic tools in combination with measurement evaluation that can be performed in a reliable and automated fashion plays a key role in this context. As the progression of various cancer diseases and the effectiveness of their treatments are related to a varying number of tumor cells that circulate in blood, the determination of their extremely low numbers by liquid biopsy is a decisive prognostic marker. To detect and enumerate circulating tumor cells (CTCs) in a reliable and automated fashion, we apply methods from machine learning using a naive Bayesian classifier (NBC) based on a probabilistic generative mixture model. Cells are collected with a functionalized medical wire and are stained for fluorescence microscopy so that their color signature can be used for classification through the construction of Red-Green-Blue (RGB) color histograms. Exploiting the information on the fluorescence signature of CTCs by the NBC does not only allow going beyond previous approaches but also provides a method of unsupervised learning that is required for unlabeled

training data. A quantitative comparison with a state-of-the-art support vector machine, which requires labeled data, demonstrates the competitiveness of the NBC method.

Beteiligte Forschungseinheiten

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