

# Optimal dynamic treatment regimes using decision lists

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**Abstract:** A dynamic treatment regime (DTR) formalizes precision medicine as a series of functions over decision points. At each decision point, it takes the available information of a patient as input and outputs a recommended treatment for that patient. A high quality DTR tailors treatment decisions to individual patient as illness evolves, and thus improves patient outcomes while reducing cost and treatment burden. To facilitate meaningful information exchange during the development of DTRs, it is important that the estimated DTR be interpretable in a subject matter context. We propose a simple, yet flexible class of DTRs whose members are representable as a short list of if-then statements. DTRs in this class are immediately interpretable and are therefore appealing choices for broad applications in practice. We develop a nonparametric Q-learning procedure to estimate the optimal DTR within this class. We establish its consistency and rate of convergence. We demonstrate the performance of the proposed method using simulations and a clinical dataset.