

Abstract

What if you had a different medical history? What if you had clicked on other products? What if another person had to approve your loan application? With enough data most models can answer this question. However, this problem becomes incredibly hard if you ask what would have had to change to cause a different outcome. How can you predict the outcome of a process that technically never occurred? Counterfactual approaches aim to respond to this question, but only a handful of researchers applied counterfactuals to multivariate sequences.

This thesis uses counterfactuals to answer what it takes to flip the outcome of a predicted factual outcome. For this purpose, we propose a framework called **CREATED: A way to generate viable "CounteRfactuals using Evolutionary AlgoriThms for Event Data."** The framework is capable of generating multivariate discrete sequences using a custom viability function. We show that our algorithm returns better counterfactuals than baseline models. Furthermore, we show that our counterfactuals are not only viable but also better align with the sequential structure of the factual sequence as opposed to other methods in the literature.