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Discrimination-Free Insurance Pricing

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Abstract

A simple formula for non-discriminatory insurance pricing is introduced. This formula is based on the assumption that certain individual (discriminatory) policyholder information is not allowed to be used for insurance pricing. The suggested procedure can be summarized as follows: First, we construct a price that is based on all available information, including discriminatory information. Thereafter, we average out the effect of discriminatory information. This averaging out is done such that discriminatory information can also not be inferred from the remaining non-discriminatory one, thus, neither allowing for direct nor for indirect discrimination.

Keywords: Discrimination, differentiation, insurance pricing, individual policy characteristics, discriminatory covariates, direct discrimination, indirect discrimination, neural networks, complex algorithmic models, causal inference, confounding.

1 Introduction

The basic question is as follows: given observed claims of insurance policies for which we have access to individual policyholder characteristics (e.g. gender), how can we construct an insurance tariff for which we can assure that it does not discriminate, say, w.r.t. gender? This is a highly relevant question, for instance, the current EU legislation requires gender neutral pricing, see [9]. This question has become even more relevant due to big data and recent developments in complex algorithmic models because such algorithms may be able to unfold, e.g., the gender from other detailed individual policyholder characteristics. For a broader overview on anti-discrimination laws we refer to Avraham et al. [2].