Formulating Fairness in Optimization Models

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Optimization models have long been widely used to pursue efficiency objectives, such as maximize overall benefits or minimize total cost. With fairness emphasized as an important element in many practical decisions, there are great demands for formulating fairness in optimization models to assist ethical decision-making. In this talk, we provide a review of various schemes for formulating ethics-related criteria, and present practical mathematical models. Among these schemes, those balancing fairness and efficiency are especially useful as such trade-offs are often necessary. Along with classical models of fairness-efficiency trade-offs, we present new threshold-based models of balancing Rawlsian leximax fairness and utilitarianism (an efficiency criterion).