Distributionally Robust Integrated Chance Constraint for Vaccine Distribution Problems

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We study a data-driven vaccine allocation problem to mitigate disease spread. To ensure robustness with respect to data perturbations, we model the problem as a distributionally robust optimization, and reformulated it into a large-scale nonconvex polynomial optimization. We derive degree bounds for moment/sum-of-squares relaxation to preserve asymptotic consistency and develop sparse second-order conic programming algorithms for scalability. Our method is being validated on real-world COVID-19 data.