ID de Contribution: **100** Type: **Contributed talk**

Mitigating Risks in Critical Care with Analytics

lundi 28 juillet 2025 18:00 (30 minutes)

Deciding when to stop medical treatment with uncertain outcomes and predictions is a critical challenge in intensive care units. This research develops a risk-sensitive approach to optimal medical stopping decisions by integrating outcome variability into the decision-making process and incorporating predictive information about the next state. We model the problem using a risk-sensitive Markov decision process with an entropic risk measure to capture decision risk. Our analysis reveals that under some assumptions the optimal policy follows a threshold-based structure, with a submodular value function and a risk-aware decision framework. We identify three distinct risk-sensitive strategies that diverge from the nominal stopping problem: an aggressive policy under deterministic terminal costs, a conservative policy, and a mixed strategy that transitions from conservative to aggressive actions. To evaluate the effectiveness of our model, we conduct numerical experiments on two critical decision cases: extubation and discharge. Our results demonstrate that the proposed approach achieves a more favorable balance between expected costs and risk exposure—where a slight increase in expected cost can lead to a substantial reduction in risk. These findings underscore the inherent trade-off between the immediate risks of stopping treatment and the ongoing risks of continued treatment. By leveraging our model, healthcare managers can significantly mitigate downside risk with a minimal increase in expected costs, enhancing decision-making in high-stakes clinical settings.

Authors: LOU, Zhiyuan (Technical University of Munich); XIE, Jingui (Technical University of Munich)

Orateur: XIE, Jingui (Technical University of Munich)

Classification de Session: Sequential decision-making under uncertainty

Classification de thématique: Sequential decision making under uncertainty