UNIVERSITÀ
DEGLI STUDI
FIRENZE
DiSIA
DIPARTIMENTO DI STATISTICA,
INFORMATICA, APPLICAZIONI
"GIUSEPPE PARENTI"

DiSIA SEMINAR

PhD Seminar Series

"Seminari di Statistica del Dottorato"

Babak Shahbaba

Department of Statistics
University of California, Irvine

13th February, 2:00 pm

Viale Morgagni 59, Room 205

Meta fusion: a unified framework for multimodal musion with adaptive mutual learning

Developing effective multimodal data fusion strategies has become increasingly important for enhancing the predictive power of statistical machine learning methods across a wide range of applications, from autonomous driving to medical diagnosis. Traditional fusion methods, including early, intermediate, and late fusion, integrate data at different stages, each offering distinct advantages and limitations. In this talk, we discuss Meta Fusion, a flexible and principled framework that unifies these existing strategies as special cases. Motivated by deep mutual learning and ensemble learning, Meta Fusion constructs a cohort of models based on various combinations of latent representations across modalities, and further boosts predictive performance through "soft information sharing" within the cohort. Our approach is model-agnostic in learning the latent representations, allowing it to flexibly adapt to the unique characteristics of each modality. Theoretically, our soft information sharing mechanism reduces the generalization error. Empirically, Meta Fusion consistently outperforms conventional fusion strategies in extensive simulation studies. We further validate our approach on real-world applications, including Alzheimer's disease detection and neural decoding.