

Information Bottleneck Problems: An Outlook

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Abstract: This talk focuses on variants of the bottleneck problem taking an information theoretic perspective. The intimate connections of this setting to: Remote Source-Coding; Information Combining; Common Reconstruction; The Wyner-Ahlsvede-Korner Problem; The Efficiency of Investment Information; CEO Source Coding under Log-Loss and others will be highlighted. We discuss the distributed information bottleneck problem with emphasis on the Gaussian model and highlight the basic connections to the uplink Cloud Radio Access Networks (CRAN) with oblivious processing, referring also in an example to the 'cost' of such a processing. For this model, the optimal tradeoffs between rates (i.e. complexity) and information (i.e. accuracy) in the discrete and vector Gaussian frameworks is determined, taking an information-estimation viewpoint. The concluding overview addresses the dual problem of the privacy funnel, as well as connections to the finite block length bottleneck features (related to the Courtade-Kumar conjecture) and entropy complexity measures (rather than mutual-information). Some interesting problems are mentioned such as the characterization of the optimal power limited inputs ('features') maximizing the 'accuracy' for the Gaussian information bottleneck, under 'complexity' constraints.

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