MAXIMUM LIKELIHOOD AND MINIMAX ENTROPY. COMPLEMENTARITY OF TASKS, IDENTITY OF SOLUTIONS.

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Maximization of likelihood (ML) is well-established method of finding estimators with desirable asymptotical properties. The method relays upon a sample and an assumed pmf/pdf the sample came from. The choice of the sample generating pmf/pdf is ambiguous. Shannon's entropy maximization (ME), should be in order to bring a nontrivial result, confined by some constraints, and it is where its ambiguity lays.

As it is shown here, ML and ME are under rather general conditions complementary, and in favor of each other. ME takes out the ambiguity present in the ML, and vice versa.

Concept of exponential family is generalized by simple and general exponential forms. Maximum Likelihood and Maximum Entropy tasks are defined. ML task on the simple exponential form and ME task on simple potentials are proved to be complementary. ML task on general exponential form and ME task on general potential are weakly complementary, leading to the same FOC's. A hypothesis about complementarity of ML and MiniMax Entropy tasks, brought up by a special case analytical as well as several numerical investigations, is suggested in this case.

MiniMaxEnt can be viewed as a generalization of MaxEnt for parametric linear inverse problems.