Contribution ID: **18** Type: **not specified**

Analytical problem solving based on causal, correlational and deductive models

Tuesday, 12 September 2023 14:45 (30 minutes)

Many approaches for solving problems in business and industry are based on analytics and statistical modelling. Analytical problem solving is driven by the modelling of relationships between dependent (Y) and independent (X) variables, and we discuss three frameworks for modelling such relationships: cause-and-effect modelling, popular in applied statistics and beyond, correlational predictive modelling, popular in machine learning, and deductive (first-principles) modelling, popular in business analytics and operations research. We aim to explain the differences between these types of models, and flesh out the implications of these differences for study design, for discovering potential X/Y relationships, and for the types of solution patterns that each type of modelling could support. We use our account to clarify the popular descriptive-diagnostic-predictive-prescriptive analytics framework, but extend it to offer a more complete model of the process of analytical problem solving, reflecting the essential differences between causal, correlational and deductive models.

Classification

Mainly application

Keywords

Problem solving; Statistical engineering, Statistics

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Session Classification: INVITED ISEA

Track Classification: Other/special session/invited session