

Abstract Submitted
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Network Analysis of Force Concept Inventory Responses to Improve Diagnostic Utility¹ ERIC BREWE, Florida Intl Univ, JESPER BRUUN, University of Copenhagen — The Force Concept Inventory (FCI) is a diagnostic instrument designed to investigate students' understanding of Newtonian Mechanics and is widely used in Physics Education Research. One of the strengths of the FCI is that the distractors are drawn from student conceptions based in their experiences. The distractors chosen are often more informative about student's understanding as they identify the particular nature of students' alternative conceptions. We propose a network based analysis of the FCI which will enhance the utility of the FCI as a diagnostic tool for identifying student conceptions. In this approach, student responses are treated as a bipartite network which is then projected into two networks - students and responses. The response network includes all responses that are shared among students. We use the LANS backbone extraction algorithm to identify patterns in student responses. We use community detection algorithms on the backbone networks to identify clusters of common responses which map to models held by students, for example, “force is needed for movement” and “the active agent uses the most force.” This method has utility across a variety of instruments and could be used to improve instruction by providing in-depth knowledge of student conceptions.

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