Graph Homomorphism Dichotomies

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The celebrated Feder-Vardi Dichotomy Conjecture for Constraint Satisfaction has recently been established by Bulatov and by Zhuk. (Because of the profound impact the conjecture had on theoretical computer science, Feder and Vardi were jointly awarded the Alonzo Church Award for 2019.) The conjecture has a very combinatorial meaning, involving the complexity of deciding if a certain type of coloring, or homomorphism, exists. Graph theory also played a role in the eventual proof of the conjecture, alongside other fields, such as logic and universal algebra. In this historical survey talk I will focus on the graph theoretic developments leading up to the formulation, and the solution, of the conjecture, and on the many related problems that remain open.

Keywords: graph coloring, graph homomorphism, algorithm, constraint satisfaction