

Using Generative Adversarial Networks to Predict and Generate Superconductive Materials

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Abstract

Achieving a room-temperature superconductor is considered the hallmark of condensed matter physics. However, researchers have faced many challenges in their search for such a material. Searching through the entire phase diagrams of each of these materials would likely take decades without a way to accelerate the process. It would be of great assistance to researchers in the field to be able to differentiate between non-superconductors and superconductors through a data-based method. Recent work has used easily observable characteristics to predict critical temperature. However, no clear association has been found between the easily observable characteristics of a material and its superconductive phase diagram, so a supervised learning method isn't realizable. Instead, unsupervised learning must be used. Herein, we report a solution to this problem: a generative adversarial network (GAN) that allows researchers to evaluate materials to further investigate for possible superconductivity. Such a method would also be able to generate possible superconductive materials to be tested.