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One Out of 400 Choose 100

The purpose of this project was to demonstrate a method for solving NP problems in Polynomial time. The NP problem that was studied was, “Given 400 students, select 100, so that no two students form a predetermined forbidden pair.”

A computer program was created to execute the method. The method used for solving this NP problem is to check students as they are selected. If a program were to select all 100 students first, and then check for forbidden pairs, it is almost certain that a forbidden pair will be within the selection. Instead, the program checks for forbidden pairs as it selects students (either systematically or randomly selected), and immediately removes any students that forms a forbidden pair.

The results showed that this method does not always work within a ten minute time limit. The method was able to select 100 students with up to 2,000 forbidden pairs. For 70,000 forbidden pairs or more, the method, systematically selecting students, was able to check every possibility. When the number of forbidden pairs was 2,000 (for 2,000 pairs sometimes the program can select 100 students, sometimes not) to around 60,000, no solution could be found within 10 minutes.

Although the method described did not succeed, it is a good starting point that can be improved. The method is better than total random selection. Somebody else can generate a complete solution starting from this.