

All-pairs testing is a way of reducing a large, intractable combinations testing problem to a manageable size.

To demonstrate, suppose that it is necessary to test a new car manufacturing plant. In order to do this, it is necessary to test the cars that the plant makes to certify that they operate correctly. The possible engines are I-4, I-6, V-6, and V-8; the possible capacities of these engines are 1.8 L, 2.0 L, 2.2 L, 2.4 L, and 3.0 L; the possible car types are SUV, sports car, van, passenger car, and truck; the possible transmissions are automatic and manual; the possible door configurations are two-door and four-door; and the possible airbag configurations are front airbags and front airbags with side airbags. To test every possible configuration of these parameters would require testing of 800 different vehicles. Realistically, testing of 800 car types is impossible, so a way to decrease the number of vehicles to test must be devised.

All-pairs testing is a way of making sure that every parameter is tested with every other parameter at least once. Each type of engine would have to be tested with every possible engine capacity, each type of transmission would have to be tested in each type of vehicle, and so on. For example, a 4-door SUV with a 2.4 L V6, manual transmission, and front airbags would contain fifteen different pairs of parameters. The configurations to use for this type of testing can be determined with a freeware tool called AllPairs, created by Satisfice, Inc (see: AllPairs.zip). For the testing problem defined above, AllPairs produces a list of 29 test cases that tests every possible pair of parameters.

Testing 29 cars is a much more tractable testing task than testing 800, and it is a thorough enough testing regimen to add confidence in the new manufacturing line.