

Combinatorial Designs and Software and Network Testing

Abstract: Verification testing is one of the most crucial and time consuming aspects of the development process for Software and network companies. Competition in the market place demands that products be released as soon as possible. However the sale of imperfectly functional software can annoy and turn off users and customers. It is vital to have a rapid and thorough testing process. Combinatorics has been a major tool in the past ten years used to optimize testing. We start with a black box model: the unit (software or network) has k variable input parameters and will report a pass or fail with respect to its design criteria. With only this knowledge we explore how to approach testing the unit with measurable confidence. We will start with simplified models and develop some solutions. Then we will examine ways to make the models more realistic including the move to a white box model (some knowledge of internal structure), focusing techniques (how to identify the exact source of the error of a test case fails). We will use combinatorial designs, codes, graphs and homomorphisms among our mathematical tool-box.