Throughout the twentieth century, landmines have been used to inhibit the movement of military troops and vehicles. Traditionally, metal detectors have been used to effectively detect these mines. However, today, many varieties of mines are plastic-cased and contain little or no metal content, making traditional detection methods ineffective. For both military and humanitarian de-mining, a practical and reliable detection method is needed. In response to this need, several alternative detection technologies are being developed. These modern technologies are faced with the challenge of distinguishing buried non-metallic mines from rocks and other geological clutter. They also have to be capable of operating under a variety of environmental and soil conditions. One such technology being developed is ground penetrating radar (GPR). By transmitting high frequency electromagnetic pulses into the ground and analyzing the reflected signals with a detection algorithm, both metallic and non-metallic mines can be identified with relatively high success. However, a tradeoff occurs when trying to maximize the detection rate: as the sensitivity of the detection algorithm is increased, the number of false alarms is also increased. Having a high detection rate is crucial to the reliability of the detection system, but having a high false alarm rate makes it impractical to use. The goal of this research is to optimize both of these factors, by statistically correlating the results of multiple detection algorithms and fusing their confidence outputs together. By incorporating multiple algorithms in the detection process, the benefits of the individual algorithms can be coalesced to improve the overall detection and false alarm rates.