Attribute Analysis of Construction Materials with Ground Penetrating Radar (GPR)

The purpose of this project is to develop a program that gives a labeled map of the locations of construction materials based on attribute analysis from Ground Penetrating Radar (GPR) scans. Attribute analysis is advantageous because it allows researchers to study more than one characteristic about a material or structure that is not visible from the surface. Attributes are characteristics of the GPR data that can identify material composition and are calculated from GPR scans of a site. The chosen attribute is attenuation. Attenuation is the rate at which a signal travels or decays through a material. The program is based on a binary classification system that locates different materials based on their attenuation. The binary system allows for more attributes or materials to be added to the program while still being able to locate them properly. We present an application of attribute analysis and classification of GPR scans from Corvin Castle (Hunedoara, Romania), which is composed of many different materials from a number of restorations and expansions since the 13th century. Categorizing materials based on their attributes can improve damage detection techniques. By establishing what range of attribute values correspond to different materials and displaying the resulting classification, the program will provide a visual overview of the locations of the different materials. The information gained from this project can aid restoration and preservation efforts