The paper introduces a framework to reconstruct polyhedral building models from Airborne Laser Scanning (ALS) data. An eigen-analysis is first applied to point cloud to filter out non-plane points and yield normal for the remaining points. In second step, all the planer points are segmented into several sets using 3D region growing method. To optimize the growing process, both of the geometry and topology are considered such as the distance between a point to neighboring points, a plane to point, and the difference between two normal. After the segmentation, the best fitting plane in each of the point set is derived and the polyhedral structure is extracted. In final step, the extracted polyhedral structures are combined into a building model using Constructive Solid Geometry (CSG) method which is based on boolean operations of solid models. In previous studies, there are two mainstreams to reconstruct building models, namely, data-driven and model-driven approaches. Data-driven approach is based on the information of input point clouds while model-driven approach utilizes pre-defined primitives to match with input point clouds and reconstruct models. The former approach is sensitive to the noise and unorganized points, and the latter approach has lower flexible in reconstruct stage. The base idea of this study is combining these two aforementioned methods into a hybrid one in which the point cloud information is considered in the segmentation process, and shape detection is applied to detect specific shape for each segmented patch. The experimental results show the proposed method has acceptable performance in terms of accuracy and flexibility.