The goal of this thesis is to show techniques of solving the maximum independent set problem on intersection graphs of disks in the plane. An intersection graph is a graph whose vertices are represented by disks and two vertices are adjacent if and only if the corresponding disks have non-empty intersection. The main section of the paper is dedicated to the approximation algorithms and heuristics (grid shifting, forbidden subgraph, bounded neighborhood of a vertex). We will give an overview of disk graph classes (general and unit disk graphs, graphs with bounded radius of disks). These classes are studied and used to model practical problems. We will briefly describe some of these applications (map labelling, facility placement). A program demonstrating several algorithms and heuristics is enclosed with this work.