This work deals with the description and analysis of image data, which related to the initial stages of the thin film growth. The introductory retrieval section includes a description of thin films and methods of their deposition. The following part is an overview of the growth models of thin layers. The heart of my thesis is the analysis and modification of morphological methods and interpretation of their results. The emphasis is placed on the statistical aspect of methods and their optimal implementation due to the accuracy of the results. The work shows how to modify the radial distribution function and methods based on so-called Voronoi and Delaunay triangulation tessellation so that they can better affect the character of test data. New methods are tested both on the experimental and model data. Then we examine their robustness, sensitivity and their mutual independence. At the conclusion it is introduced and analyzed a new model of thin film growth.