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Set Estimation for Dimensional Control in Shipbuilding

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Within the framework of the Mixed Research Center (CEMI) between the company Navantia and the University of A Coruña, one of the research lines consists of using statistical methods for dimensional control of panel production. This paper will present some advances in the use of set estimation for detecting singular elements in panels and determining their geometric characteristics (angles between elements, lack of flatness, welding defects, etc.), which allow detecting deviations with respect to nominal parameters and minimizing industrial reprocessing in shipbuilding.

There exists currently a pilot system for obtaining point clouds using artificial vision for inspecting dimensional control and welding quality. The datasets (point clouds) extracted from panel scanning have a typical size of the order of hundreds of millions of points. As a consequence, traditional set estimation methods can be very time-consuming from a computational viewpoint. Through the use of subsampling, nonparametric density estimation of projections of the point cloud, as well as modern set estimation techniques (such as those existing in the R package *alphashape*), efficient algorithms have been implemented that allow carrying out dimensional quality control for manufactured panels.

Keywords

Set estimation; point clouds; shipbuilding

Classification

Both methodology and application

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