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ASSESSMENT OF STANDARDIZATION OF COMPATIBILITY USING GENETIC ALGORITHMS

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Abstract: In manufacturing companies, every time a new product is developed, designers tend to recreate components instead of using the existing designs causing design divergence. This causes manufacturing cost increases as well as increases in time to market for new products. Through Standardization, it is possible to take advantage of the benefits of mass production such as increased reliability, lower lifecycle costs and lower time to market in product development. In firms, during standardization processes, candidates are searched in databases through Shape Similarity Assessment Algorithms (SSAA). While current SSAA provide a means of reducing part proliferation during the development of new products, they are unsuccessful when it comes to assess if any pair of components is standardisable mainly due to their insensitivity to component details such as component interfaces. In this work, a set of standardization compatibility metrics for the selection of standardization candidates is proposed. This is achieved through the development and application of a voxelization algorithm which assesses volumetric commonalities between the assessed geometries. The metrics are dependent on the relative alignment between components, and maximum standardization compatibility is only achieved if the alignment is such that there is a match between interfaces of different components. In this work a local search Genetic Algorithm is applied so as to find the optimal alignment between components for the development of standard designs. Preliminary results indicate that while there are several local optimal results for the proposed metrics, the global solution is attainable using a local search approach as opposed to conventional genetic algorithms, which tend to converge to local optima.