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## **DATA MINING FOR DISCOVERING DEFECT ASSOCIATIONS AND PATTERNS TO IMPROVE PRODUCT QUALITY: A CASE FOR PRINTED CIRCUIT BOARD ASSEMBLY**

*Tuesday, 14 September 2021 16:45 (20 minutes)*

Meeting customer quality expectations and delivering high quality products is the key for operational excellence. In this study, a printed circuit board (PCB) assembly process is considered for improvement. Associations between the defects as well as patterns of the defects over time are investigated. A priori algorithm for association rule mining and Sequential Pattern Discovery using Equivalence classes (SPADE) algorithm for pattern mining were implemented in R and SPMF, respectively. A dataset consisting of seven years of defect data standardized according to the IPC Standard was prepared for this purpose. Association analysis was done on the basis of card types and the years. It is concluded that associations between defect types change according to the card type due to design parameters. Pattern analysis indicated that some defect types are recurring over time. For example, insufficient solder and tombstone defect types recurred over and over. On the other hand, there were also some defect types, such as excess solder defects causing solder balls, that occurred sequentially. As the root causes of excess solder defects were eliminated, most of the potential solder ball defects were also eliminated. In the following, preparation of the dataset for analyses, implementation, and results of the study are discussed with examples.

### **Keywords**

Association Rules, Sequential Pattern Mining, Printed Circuit Board Assembly

### **Special/invited session**

**Primary authors:** PARLAKTUNA, Ayse Merve; Prof. TESTIK, Murat Caner (Hacettepe University)

**Presenter:** PARLAKTUNA, Ayse Merve

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