# Analysis and Identification of Different Factors Affecting Students' Performance Using a Correlation-Based Network Approach

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**Abstract :** The transition from secondary school to university seems exciting for many first-year students but can be more challenging than expected. Enabling instructors to know students&rsquo; learning habits and styles enhances their understanding of the students&rsquo; learning backgrounds, allows teachers to provide better support for their students, and has therefore high potential to improve teaching quality and learning, especially in any mathematics-related courses. The aim of this research is to collect students&rsquo; data using online surveys, to analyze students&rsquo; factors using learning analytics and educational data mining and to discover the characteristics of the students at risk of falling behind in their studies based on students&rsquo; previous academic backgrounds and collected data. In this paper, we use correlation-based distance methods and mutual information for measuring student factor relationships. We then develop a factor network using the Minimum Spanning Tree method and consider further study for analyzing the topological properties of these networks using social network analysis tools. Under the framework of mutual information, two graph-based feature filtering methods, i.e., unsupervised and supervised infinite feature selection algorithms, are used to analyze the results for students&rsquo; data to rank and select the appropriate subsets of features and yield effective results in identifying the factors affecting students at risk of failing. This discovered knowledge may help students as well as instructors enhance educational quality by finding out possible under-performers at the beginning of the first semester and applying more special attention to them in order to help in their learning process and improve their learning outcomes.

**Keywords :** students' academic performance, correlation-based distance method, social network analysis, feature selection, graph-based feature filtering method

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