In the wake of the progress of our society as well as the technology, online shopping gradually becomes a trend more and more preferred by young people. However, it also presents several problems remaining to be solved, such as the credibility of online sellers. On the other hand, manufacturers also suffer from the deficiency in keeping up with the market and the customers' needs. The paper mainly speculates on the sales of cell phones as a representative, aiming to construct a model capable of analyzing which are the most crucial factors and traits promoting the success of certain types of cell phones.

As for the beginning, we gather the data from AliExpress, making them as the base for our further quantitative analysis. Methods including Gray Rational Analysis, Principal Component Analysis and Information Entropy are then used to process the data and extract the most crucial independent variables among the potential 26 factors. The information gain from these factors yield result that Comment Count, Good Comment Count and Search Cnt are at the top of the ranking, while Display Resolution, Recording Definition, RAM and ROM are also considered to be significant as the Principal Component Analysis indicates.

Then, we apply the results above to the further modeling process. The result from Principal Component Analysis are employed in Linear Regression, KNN algorithm and Analytic Hierarchy Process in pursuit of further detailed conclusion. For example, the method of AHP yields straightforward graphs by using qualitative analysis, and provides further insight to which specific traits in one individual variable contributes more to the success of the sales volume of that certain type of cell phone.

The results from Information entropy are applied to the BP Neural network for quantitative analysis , and the results from linear regression and KNN algorithm are employed for the Principal Component Regression and Bayes Distinction respectively for the model optimization. Instead of Analytic Hierarchy Process which only yields qualitative analysis, the three optimized methods above produce quantitative results concerning which specific traits are more crucial to the sales volume. For instances, the results indicates that cell phones with gold color, higher camera resolution and spacious ROM reveal more satisfactory sales condition. For the last step of optimization, BOOST algorithm is applied to produce more reliable and stable results. We also test the model's feasibility by using the data in the testing set, and the model can successfully predict the volume of sales. Furthermore, the sensitivity analysis validates the model's stability, thus making its use in real life viable and reliable.

The model constructed not only yields the ranking of individual variables' significance relate to the phones' sales volume, but also gives insight about which particular traits contribute more to the sales of the product. It also enables the manufactures to predict the sale of certain products, given its related features, and they can be more informed of the customers' needs and thus maximizing their profits. The testing of the model proves its stability as well as reliability, making it accessible and valuable for the further application in the real life. Therefore, we believe that the optimized model proposed will yield significant social and economic value.

**Key Words:** Grey Relational Analysis, Information Entropy, Principal Component Analysis, Analytic Hierarchy Process, KNN algorithm, Principle Component Regression, Bayes Distinction, BP Neural Network, BOOST algorithm