Roller coaster riding is top-rated entertainment among the youngsters. However, the ranking systems of roller coasters are largely based on the input of subjective experience and rating instead of quantitative analysis. Therefore, the model we construct aims to provide a reliable method used for the roller coaster-rating based on their properties and objective analysis.

To begin with, we do the data cleaning and interpolation to extract the relevant data. Noisy data are being rectified, and some missing data are interpolated. The process simplifies our model by reducing the independent variables and raising accuracy. We obtained nine properties of the roller coasters for further analysis. Next, we analyze the data mainly by applying Principal Component Analysis to determine an initial ranking of roller coasters and compare it with the ranking online to see if the result can be taken as the training set in the methods that follow.

The model is first constructed with the help of Linear Regression and the KNN algorithm. It can be seen that the two models manifest quantitative analysis towards the issue, while the result is not accurate enough, which then brings about the optimization model. The Principal Component Analysis focuses on the most relevant independent variable with continuous data, while the Bayes Distinction has a strong ability to manipulate the discrete data. We also utilize BP Neural Network to solve the issue, which has the ability to construct an optimized model with proper training sets and possess high accuracy. Then the XG Boosting algorithm is employed to synthesize the three optimized models and produce a more reliable and stable rating. Ultimately, the sensitivity analysis validates the model's stability and precision, thus making its use in real life viable and reliable.

Advantages of the model we construct are shown in various aspects. The optimized model not only provides the quantitative results based on each independent variable but also successfully provides us with an objective rating of every roller coaster, which is far more persuasive than the solely subjective inputs. Furthermore, our model synthesizes the results from various advanced methods with clear logic chain, which guarantees our model's accuracy as well as stability. It is also flexible with the change of data input and enables the self-studying and self-improving through proper additional training sets, so the model is suitable to be applied under various circumstances. Moreover, we demonstrate our concept of the application with the algorithm applied. The application mainly aims to recommend the roller coasters based on the global ranking and individual's preference, as well as constructing a search engine to save the users' time on roller coaster selecting. All of the functions are supported with concrete programming frames, the methods of which include correlation coefficients, Mahalanobis, and BP neuron network. Thus, it can successfully achieve the goal of fulfilling the potential riders' demands.

To conclude, our model proposes a reliable and precise method for the rating of roller coasters based on objective algorithms. It presents high accuracy, reliability, and stability, the features of which make it stands out from other analysis based solely on subjective inputs. The application we conceive can also fulfill the users' various needs and thus possesses high pragmatic value.

**News Release: Hop till you Drop**

**----Team 8784’s New Techniques Shed Light on**

**Unique Roller Coaster Experience**

Have you ever been in want of going to an amusement park and ride the roller coasters? Have you ever be troubled by the issue that you do not know which roller coaster is the most suitable for you? When you are planning to ride the roller coasters, have you once wondered to have a scoring system that can have an objective rating system towards all the roller coasters around the globe which is not affected by personal opinions or perceptions? If this is the case, you do not need to despair anymore. Fortunately for you, team 8784 has skillfully addressed the concern, who invented a set of algorithms which specially deal with the rating of roller coasters. Don’t forget that taking the roller coasters is the obsolescence for almost everyone. With the rating of roller coasters, you are able to reap the most overwhelming sense when riding them!

Based on 300 roller coasters all over the world, team 8784 utilized several techniques to evaluate each one of them eloquently. They take diverse accounts into consideration, not only the standards that can flash into your mind, such as the speed, height, or the number of inversions, but also some factors that are less concerned but play a significant role in the consideration of people, including the type of coasters, even the material that the coasters are made from. Their algorithms are also well-considered, having a notable performance in different kinds of variables. They employed the cutting-edge BP Neural Network, simulating the principle of human brains and achieve an accuracy of over 99%. They applied XG Boosting algorithm to synthesize the various methods to the problem, of which the fundamental theory is that a complicated issue can be better estimated when synthesizing the judgment of each expert than that of a sole expert. Hence, their solution is credible and reliable.

We believe that you are eager to know which roller coaster leads the rank, and here it comes. The one which is on the top of the list names T Express locates in Everland Park, Yongin-si, Gyeonggi-do, South Korea, followed by roller coasters in France, the US, China, and Japan. The best roller coaster in the US is Apocalypse Six Flags America opened in 2012, lying in Upper Marlboro Maryland with a 90-feet drop, 100.0 feet high, 55.0 mph speed, 2900.0 feet long. A single loop costs approximately 2 minutes. No matter you want to run after the best roller coasters or have a suburban trip, the new ranking will never let you drop.

Want to personalize your recommendation? Don’t hesitate to download the newly-designed app given by team 8784. It features several functions. From the best roller coasters in the world to the best coasters only for your interest, from the enumeration of the entire roller coasters to the search engine of your roller coasters, you can find whatever you want in the application. Based on big data of all the users and your personal information, it can personalize your preference and dynamically adjust the recommendation just for you. You can also search the parameters of the roller coasters if you want.

No matter whether you are a Spartan or a spare time traveler, no matter whether you are a crazy fancier or a casual visitor, as long as you come and visit, a sea of roller coasters will be unveiled in front you. With the guide from team 8784, you will definitely be overwhelmed with the bliss on the top, abuzz with the loop, and hop till you drop.