

After the first semester of successfully launching my initial attempt in data mining 1 with a wide application and theory in statistics, ml and a little bit deep learning lol, it becomes fun. This semester I am taking this fun Data Mining 2 course, and I can't stop but want to write about what I learn, feel, confusion, and I am excited about.

With the first quarter of this semester passed by, we are reheating the concepts and models in the family of linear with more spicy in gauging uncertainty and infusion ml with the beauty of inference statistics.

Different than the previous dump in a linear regression model, feed that data, impose a forced training. I delve deep into the non liner base function and how that elevate the ability in the structure of linear model to capture the variation of the data pattern, polynomial model is a beauty and it allows you to tune the degree, to get to know your data even with some risk of overfitting. But that's not the limitation, with gaussian processes, you can even capture the inference statistic with your prediction, see my gaussian processes model [here](#).

With the approach of design the kernel that capture the data pattern in the short, middle and long terms, the model not only capture the underlying data patterns of this prediction, but also give us the beautiful variation, and the ability to do inference statistic.

When I build this model, I also find out the design of the kernel is critical in gaussian processes. I started with a simpler kernel  $K_1 + K_2$  with the attempt to capture the longtern and periodic pattern of the data, and it turns out the prediction be a ugly rectangle, only after I elevate the kernel design to be  $K_1 + K_2 + K_3 + K_4$  with the capability of short, middle, long pattern capturing and adding the white noise, the model finally started to show its capability.