**Feature Engineering:**

Feature engineering is an informal topic, but one that is absolutely known and agreed to be key to success in applied machine learning.

When your goal is to get the best possible results from a predictive model, you need to get the most from what you have.

The results you achieve are a factor of

1. the model you choose,
2. the data you have available and
3. the features you prepared.
4. Even your framing of the problem and
5. objective measures you’re using to estimate accuracy play a part.

* Variable transformation:  transformation is a process that changes the distribution or relationship of a variable with others.
* Variable / **Feature creation**.

1. ***Business driven features***
2. ***Data driven features***
3. ***Indicator features : Ex:*** age\_cutoff, n\_bedrooms , weeks with holidays, festive weeks,
4. ***Interaction features:*** highlighting interactions between two or more features.  some features can be combined to provide more information than they would as individuals.
5. ***Feature representation:*** Date and time features: represent as week or months can help. Grouping sparse classes :You can try grouping similar classes and then grouping the remaining ones into a single "Other" class  Depending on your machine learning implementation, you may need to manually transform categorical features into dummy variables. You should always do this *after* grouping sparse classes.

More complex predictive modeling algorithms perform feature importance and selection internally while constructing their model. Some examples include MARS, [Random Forest](http://en.wikipedia.org/wiki/Random_forest#Variable_importance) and Gradient Boosted Machines. These models can also report on the variable importance determined during the model preparation process

In error analysis I typically take observations that have been missclassified by the model and try to think about the why and look for insights that might lead to new ideas for features.

Refrences:

<https://machinelearningmastery.com/discover-feature-engineering-how-to-engineer-features-and-how-to-get-good-at-it/> (Highly recommended)

<https://www.quora.com/What-are-some-best-practices-in-Feature-Engineering>