### Frequentist inference versus Bayesian inference

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| **Frequentist inference** | **Bayesian inference** |
| * Concentration of tests and assumptions | * Based on several probability rules (the most important being Bayes rule) |
| * Provides single point estimates | * Provides posterior distributions which reflects the degree of uncertainty related to the results |
| * Estimating parameters – minimize/maximize a function | * Estimating parameters – iterative process |
| * It is harder to introduce prior information in the model. | * Introduce knowledge in the model using priors (prior information). Posterior information can be obtained |
| * Prior information can be introduced as parameter constraints (ex: VEC model) or matrix coefficients (ex: Structural VAR) | * Prior information is introduced using distributions and parameters of distributions |

### Frequentist Linear Regression

The frequentist (classical) multiple regression:

– the transpose of the coefficient vector

– measurement error, normally distributed with zero mean and standard deviation .

The goal is to estimate . This means finding the hyperplane that best characterizes the data.

The data is trained.

The most popular method for estimating coefficients is OLS.

– the residual sum of squares

at OLS method.

### Bayesian Linear Regression

Bayesian approach for the linear regression:

The response values are sampled from a multivariate normal distribution that has the following parameters:

* *Prior Distributions:* Prior knowledge about parameters can be introduced using prior distributions.
* *Posterior Distributions:* probability distribution that characterizes uncertainty on coefficients.