# **What is the process of Stacking?**

Stacking, also known as *"****Stacked Generalization,****"* is a machine learning ensemble strategy that integrates many models to improve the model’s overall performance. The primary idea of stacking is to feed the predictions of numerous base models into a higher-level model known as the meta-model or blender, which then combines them to get the final forecast.

Here’s a detailed description of how stacking works:

1. ***Preparing the Data:*** The first step is to prepare the data for modeling. This entails identifying the relevant features, cleaning the data, and dividing it into training and validation sets.
2. ***Model Selection:*** The following step is to choose the base models that will be used in the stacking ensemble. A broad selection of models is typically chosen to guarantee that they produce different types of errors and complement one another. In this case, we will use SVM, Random Forest, Polynomial Regression, and System Identification.
3. ***Training the Base Models:*** After selecting the base models, they are trained on the training set. To ensure diversity, each model is trained using a different algorithm or set of hyperparameters.
4. ***Predictions on the Validation Set:*** Once the base models have been trained, they are used to make predictions on the validation set.
5. ***Developing a Meta Model:*** The next stage is to develop a meta-model, also known as a meta learner, which will take the predictions of the underlying models as input and make the final prediction. Any algorithm, such as linear regression, logistic regression, or even a neural network, can be used to create this model. In this project, the meta model will be Neural Network.
6. ***Training the Meta Model:*** The meta-model is then trained using the predictions given by the base models on the validation set. The base models’ predictions serve as features for the meta-model.
7. ***Making Test Set Predictions:*** Finally, the meta-model is used to produce test set predictions. The basic models’ predictions on the test set are fed into the meta-model, which then makes the final prediction.
8. ***Model Evaluation:*** The final stage is to assess the stacking ensemble’s performance. This is accomplished by comparing the stacking ensemble’s predictions to the actual values on the test set using evaluation measures such as accuracy, precision, recall, F1 score, and so on.

