*Embedded Method*

*Embedded Methods are feature selection techniques which perform feature selection as part of Model Construction process.*

*They are called embedded methods because feature selection is embedded within the construction of ML Model.*

*These methods aim to solve the limitations of filter and wrapper methods by including interactions of the features while also being more computationally efficient.*

*AS*

*Filter & Wrapper mai 1 problem hai*

*Filter ka prblm: Filter mai columns ke interaction or relationship ko study nahi krrhe hai*

*&*

*Wrapper ka kya scene hai ki*

*yeah columns ke interaction & relation ko study krta hai but computationally expensive hai.*

*& hum bade dataset pe lagahie nahi skte*

***Embedded solve krta hai yeah prblm ko***

*(lasso, ridge, elasticnet)*

*With ML Algos*

*Koibhi*

*ML algo hai jiske pass yeah 2 attribute hai vo use krskte hai hum as a embedded method*

*The 2 attribute are*

1. *coef\_*
2. *Linear Regression*
3. *Logistic Regression*
4. *Ridge Regression*
5. *Lasso Regression*
6. *Elastic Net*
7. *feature\_importance\_*

*Yeah Tree based Algo mai milta hai mostly*

1. *Decision Tree*
2. *Random Forest*
3. *Gradient Boosting*

*Select From Model*

*Yeah 1 Transformer hai*

*Yeah hum use isliye krte hai ki Embedded Technique Apply karsake.*

***Advantages & Disadvantages of Embedded Technique***

***Advantages***

***1.Performance:***

*They are generally more accurate than filter methods since they take the interactions between features into account.*

***2. Efficiency:***

*They are more computationally efficient than wrapper methods since they fit the model only once.*

***3. Less prone to overfitting:***

*They introduce some form of regularization , which helps to avoid overfitting.*

*For E.g Lasso & Ridge regression add a penalty to loss function shrinking some coefficient to zero.*

***Disadvnatages:***

1. ***Model Specific:***

*Since they are tied to a specific machine learning model, the selected features are not necessarily optimal for other models.*

1. ***Complexity:***

*They can be more complex and harder to interpret than filter methods*

*For E.g: understanding why Lasso shrink some coefficient to zero & not others can be non trival.*

1. ***Tunning Required***

*They often have hyperparameters that need to be tuned like the regularization in Lasso and Ridge Regression.*

1. ***Stability***

*Depending on the model and the data, small changes in the data can result in different set of selected features. This is especially true for models that can fit complex decision boundaries like decision trees.*

*Recursive Feature Elimination*

***Yeah Wrapper hai kch bolte hai & kch bolte hai Hybrid hai***

***F1, F2, F3, F4 y***

***1 Model use krte hai jisme coef\_ yatou feature\_importance vala attribute hoo***

***Ush Columns ko nikaldete hai jiska feature importance sbhse kamm hai***

***RFECV***

***Agar Kamm Number of Columns***

***Exhaustive Selection use karo directly***

***Agar zyaada Columns hai then sochna padega.***