

# Report

## Titanic – Machine learning from Disaster

### Objective

The objective of the "**Titanic: Machine Learning from Disaster**" competition on Kaggle is to build a predictive model that determines whether a passenger on the Titanic would have survived the disaster based on various features, such as age, gender, class, and other passenger data. Various machine learning models were employed to achieve accurate predictions.

### Libraries used

The following Python libraries were used throughout the project:

- **pandas**: For data manipulation.
- **numpy**: For numerical operations.
- **matplotlib & seaborn**: For data visualization.
- **scikit-learn**: For model building and evaluation.

### Data Preprocessing

#### **Loading Data**

Both train and test datasets were loaded.

#### **Info Of data**

Using pandas function `info()` and `describe()` to get knowlegde of train and test data

#### **Handling Missing Values**

Calculates missing value in each column of train and test using pandas `isna()` function.

Numerical columns: Filled with median values.

Categorical columns: Filled with the most frequent values.

#### **Mutual Information**

Calculated to understand the relationship between features and the target (house price). Using scikit learn mutual info classification function to get mutual information between features and target. Features with low mutual information were dropped.

## Correlation Matrix

A correlation matrix was created to identify highly correlated features, which were then removed to avoid multicollinearity. Using seaborn lib to plot the heatmap.

## Encoding

To convert categorical features into numerical ,i used one hot encoding function of scikit learn Library.

## Scaling

Standardscalar function of scikit learn is used to scale the numerical features.

## Model Selection

Several machine learning models were trained and evaluated:

- **GradientBoostingClassifier**
- **AdaBoostClassifier**
- **KNeighborsClassifier**
- **LogisticRegression**
- **DecisionTreeClassifier**
- **SVC**
- **RandomForestClassifier**
- **XGBClassifier**
- **CatBoostClassifier**
- **LGBMClassifier**
- **GaussianNB**
- **BernoulliNB**

## Evaluation Metrics

Different metrics were used to evaluate the performance of the models:

- **Accuracy**
- **Precision**
- **Recall**
- **F1\_score**

## Best Performing Model

Out of all the models, **SVC** performed the best.

## Hyperparameter Tuning

I performed hyperparameter tuning on the SVC model using **GridSearchCV** to find the optimal combination of parameters, which further improved the model's accuracy.

## Conclusion

Through a systematic approach of data preprocessing, feature engineering, model selection, and hyperparameter tuning, I was able to develop a highly accurate model for predicting survived person.

## Link

[https://github.com/rajiv3011/Machine\\_learning/blob/main/Kaggle/Titanic.ipynb](https://github.com/rajiv3011/Machine_learning/blob/main/Kaggle/Titanic.ipynb)