

Feature Explanations:

1. Age_Fare

- Explanation: This feature multiplies a passenger's age and fare paid.
- Why useful: It captures interactions between socio-economic status (fare) and age, potentially identifying high-paying young or old passengers with unique survival patterns.

2. Family_Size

- Explanation: Sum of siblings/spouses (SibSp) and parents/children (Parch) aboard, plus one (the passenger themselves).
- Why useful: Passengers traveling in large families may behave differently (e.g., help or hinder survival chances), or receive different treatment during evacuation.

3. Fare_Per_Person

- Explanation: Fare divided by total number of family members (including self).
- Why useful: Provides a normalized measure of ticket cost per individual, helping to understand actual wealth level independent of group size.

4. Polynomial Features (poly_Age, poly_Fare, poly_Age^2, poly_Fare^2, poly_Age Fare)

- Explanation: These are polynomial expansions of age and fare, including squared terms and interactions.
- Why useful: Helps capture non-linear relationships between features and survival. For example, very young or very old passengers might have different survival probabilities than middle-aged ones.

5. Age_Group and Age_Group_Code

- Explanation: Buckets age into labeled categories (Teen, Young, Adult, Senior) and convert them to numerical codes.
- Why useful: Categorizing age helps the model understand broad patterns in survival likelihood tied to age groups (e.g., children and elderly might get priority).