# ☐ Project 6: Model Explainability with SHA

In this notebook, we apply **SHAP (SHapley Additive exPlanations)** to interpret machine learnin models predicting employee attrition.

#### Goals:

- Understand which features drive attrition globally across employees
- Explain individual predictions for specific employees
- Provide visuals that HR leaders can use to trust model decisions
- Imports



Load Data & Model

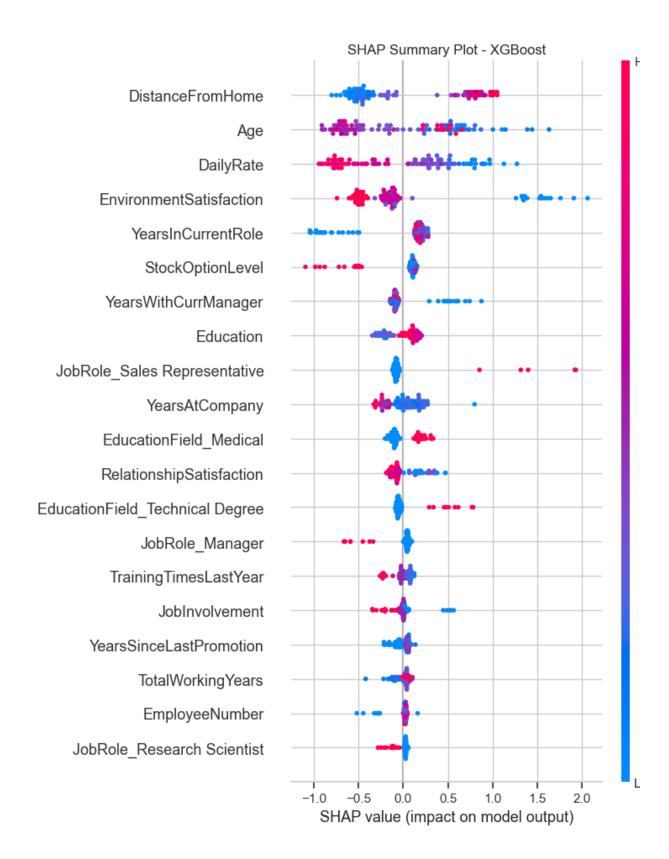
Dataset shape: (1470, 47)

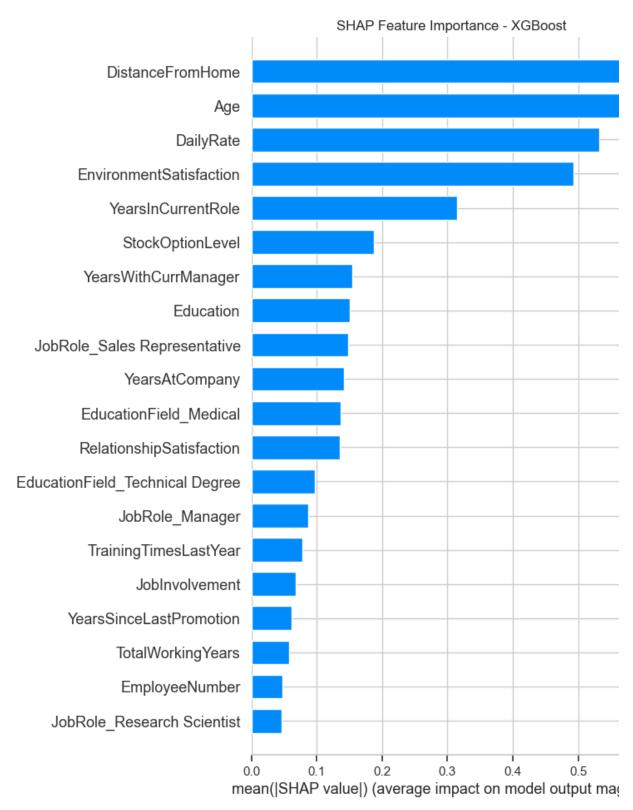
 $\boxed{3}$  Subsample for SHAP ( $\neq$  Stability Fix)

SHAP values computed on sample: (100, 47)



Visuals showing which features have the strongest impact on attrition risk across employees.

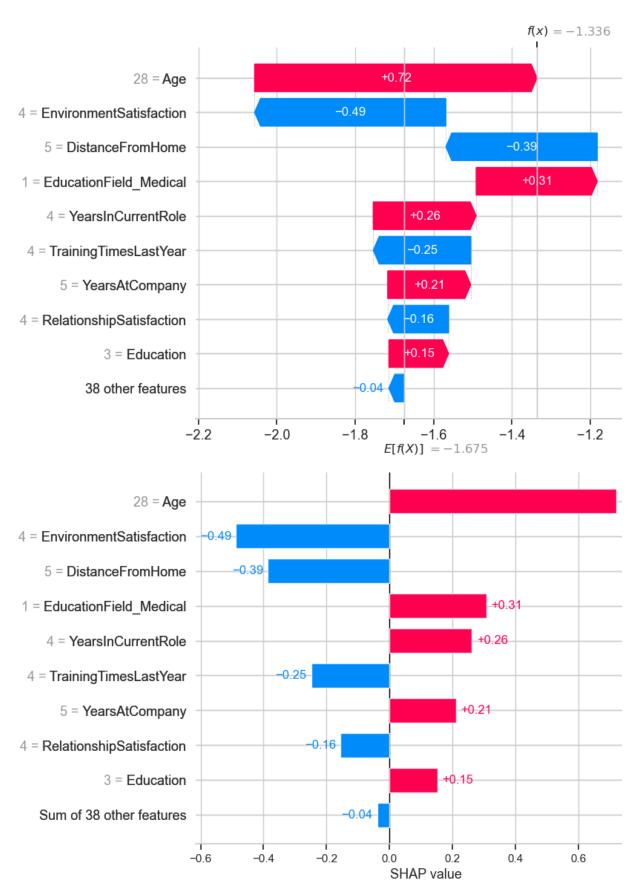




Local Interpretability (Waterfall + Bar)

For a specific employee, SHAP can explain how each feature contributed to their attrition risk. We'll show two visuals:

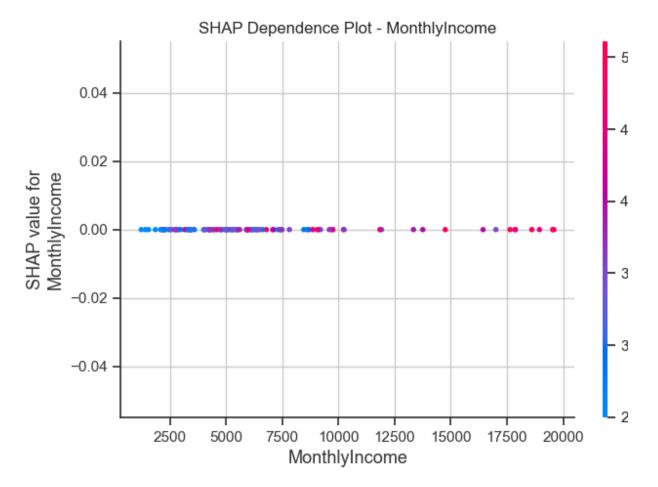
- Waterfall Plot → Directional push of each feature
- Bar Plot → Top features ranked by contribution



✓ Local SHAP plots saved: shap\_waterfall\_plot.png & shap\_local\_bar\_plot.png

## Dependence Plot (Feature Interaction)

Shows how attrition risk changes with one feature (e.g., MonthlyIncome) across employees, and how it interacts with another feature.



# Conclusions (Project 6 — SHAP Interpretability)

- Global Drivers: SHAP summary and feature importance plots confirm that Distance From JobRole, and Daily Rate are the strongest global drivers of attrition.
- Local Explanations: For individual employees, SHAP waterfall and bar plots show *why* a p was made, highlighting the most influential factors (e.g., frequent overtime or lower income)
- **Feature Interactions:** Dependence plots reveal how attrition risk changes across values of features (e.g., attrition risk increases at lower income bands and with overtime).

### 🔑 Why this matters:

- Moves the model from a black box → to explainable AI.
- Builds **trust** for HR leaders, as they can see the reasoning behind predictions.
- Supports data-driven HR decision-making while keeping it transparent and fair.

### 

- Integrate SHAP visuals into the **Streamlit Dashboard (Project** 7) for interactive explora
- Combine SHAP outputs with **SQL pipelines (Project** 8) to deliver explainability at scale