

Explainable AI Report

Model Comparison

Model	CV Score	Test Score
Random Forest	-3.0023	0.8549
Linear Regression	-0.7644	1.0000
XGBoost	-3.2667	0.7322
Neural Network	-23.1063	0.9857

Model Performance

mean_squared_error: 0.0000

r2_score: 1.0000

Feature Importance

Feature	Importance
DATE_12/1/17	0.0570
DATE_12/1/16	0.0500
DATE_12/1/15	0.0434
DATE_1/1/92	0.0361
DATE_12/1/14	0.0360
DATE_1/1/93	0.0339
DATE_12/1/06	0.0305
DATE_12/1/05	0.0305
DATE_1/1/94	0.0293
DATE_11/1/17	0.0290
DATE_12/1/04	0.0276
DATE_2/1/92	0.0267

DATE_12/1/13	0.0255
DATE_12/1/07	0.0254
DATE_3/1/92	0.0252
DATE_2/1/93	0.0232
DATE_12/1/12	0.0217
DATE_12/1/11	0.0213
DATE_5/1/17	0.0211
DATE_3/1/93	0.0201
DATE_1/1/95	0.0199
DATE_6/1/17	0.0198
DATE_11/1/16	0.0187
DATE_1/1/96	0.0185
DATE_8/1/17	0.0184
DATE_8/1/92	0.0184
DATE_9/1/92	0.0182
DATE_6/1/16	0.0181
DATE_7/1/92	0.0181
DATE_12/1/03	0.0178
DATE_4/1/92	0.0176
DATE_5/1/92	0.0176
DATE_10/1/92	0.0166
DATE_12/1/10	0.0165
DATE_2/1/94	0.0162
DATE_3/1/17	0.0156
DATE_9/1/17	0.0152
DATE_8/1/16	0.0149
DATE_12/1/99	0.0147
DATE_4/1/17	0.0147
DATE_6/1/92	0.0147

DATE_6/1/15	0.0143
DATE_11/1/92	0.0141
DATE_5/1/16	0.0141
DATE_10/1/93	0.0141
DATE_5/1/15	0.0139
DATE_8/1/93	0.0135
DATE_5/1/14	0.0135
DATE_5/1/93	0.0134
DATE_9/1/93	0.0133
DATE_1/1/97	0.0132
DATE_7/1/17	0.0132
DATE_11/1/15	0.0131
DATE_2/1/95	0.0130
DATE_7/1/93	0.0129
DATE_4/1/16	0.0125
DATE_7/1/15	0.0123
DATE_5/1/07	0.0122
DATE_3/1/16	0.0118
DATE_11/1/14	0.0118
DATE_10/1/17	0.0118
DATE_8/1/15	0.0117
DATE_4/1/93	0.0116
DATE_12/1/02	0.0114
DATE_1/1/98	0.0113
DATE_7/1/16	0.0111
DATE_9/1/16	0.0111
DATE_4/1/15	0.0110
DATE_6/1/06	0.0110
DATE_6/1/05	0.0109

DATE_8/1/14	0.0108
DATE_6/1/93	0.0105
DATE_7/1/94	0.0105
DATE_6/1/07	0.0103
DATE_12/1/00	0.0102
DATE_12/1/01	0.0101
DATE_8/1/07	0.0100
DATE_6/1/14	0.0099
DATE_5/1/13	0.0098
DATE_4/1/14	0.0096
DATE_5/1/06	0.0095
DATE_3/1/94	0.0095
DATE_11/1/13	0.0091
DATE_12/1/09	0.0090
DATE_2/1/17	0.0089
DATE_5/1/94	0.0088
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DATE_8/1/06	0.0086
DATE_8/1/13	0.0086
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DATE_1/1/99	0.0084
DATE_5/1/08	0.0084
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DATE_4/1/13	0.0056
DATE_4/1/07	0.0055

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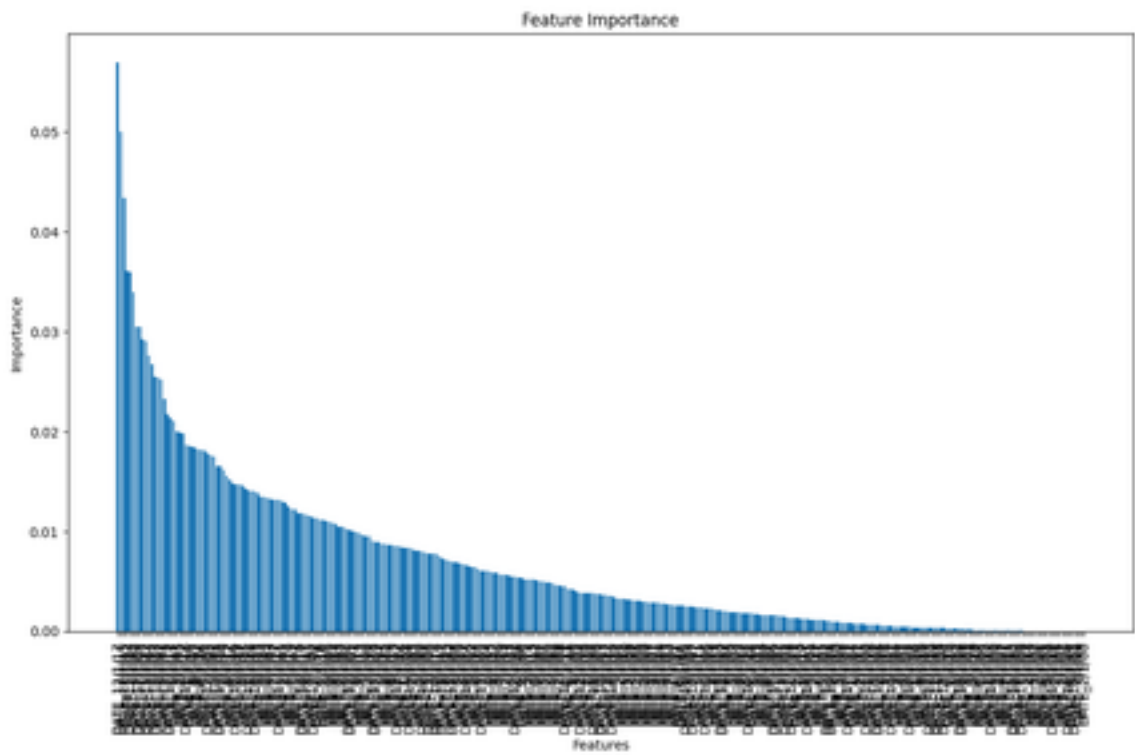
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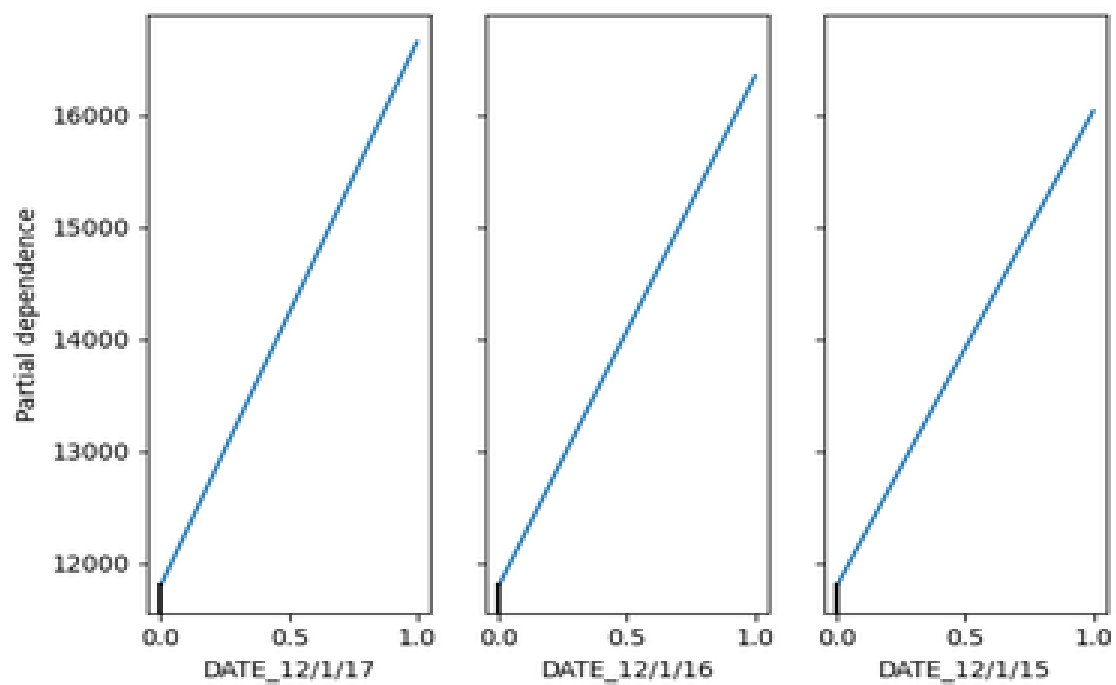
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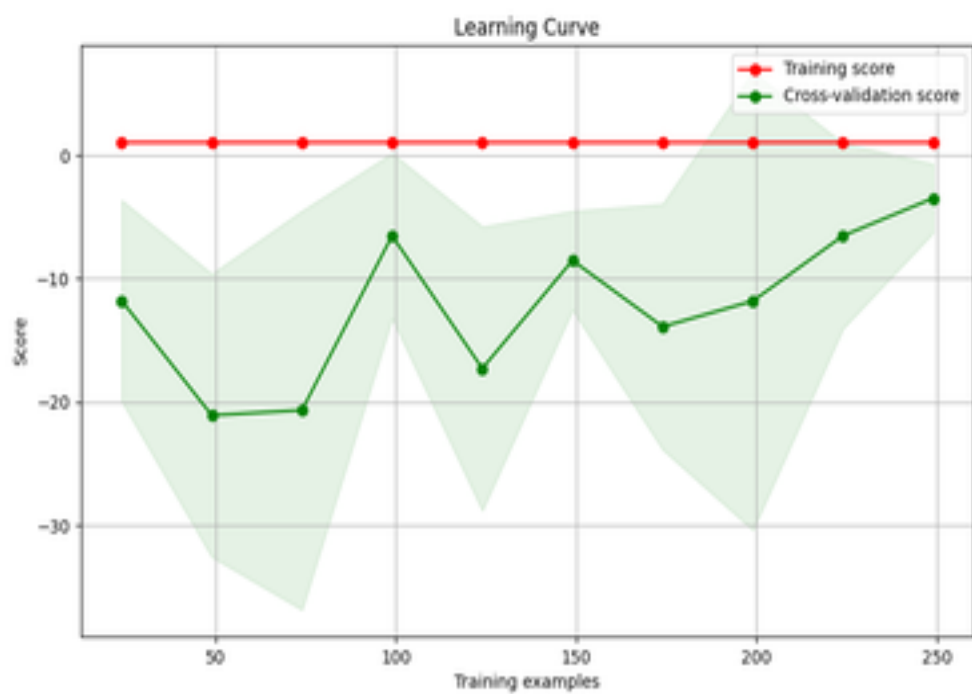
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DATE_9/1/99	0.0000
DATE_10/1/02	0.0000
DATE_7/1/99	0.0000
DATE_5/1/99	0.0000
DATE_2/1/00	0.0000

Visualizations



Partial Dependence of Top 3 Features





Correlation Heatmap of Features



LLM Explanation

Summary:

This model appears to be performing exceptionally well, potentially too well, indicating a possible issue with the data or model setup. Dates seem to be the most important factors in making predictions.

Model Performance:

- **Mean Squared Error (MSE):** This measures the average difference between the model's predictions and the actual values. A near-zero MSE like this ($1.0888560178702835e-23$) suggests the model is making incredibly accurate predictions.

- **R-squared Score:** This represents how well the model explains the variation in the data. An R-squared score of 1.0 means the model perfectly predicts the outcome based on the input data.

However, achieving perfect scores is highly unusual in real-world scenarios. This strongly suggests the model might be "overfitting" to the data, meaning it's memorizing the training data instead of learning general patterns.

Important Features:

The top 5 important features are all dates:

1. **DATE_12/1/17:** This date has the highest influence on the model's predictions.
2. **DATE_12/1/16:** Similar to above, this date also plays a significant role.
3. **DATE_12/1/15, DATE_1/1/92, DATE_12/1/14:** These dates are also important, though their influence is slightly lower.

The significance of these specific dates is unclear without more context about the data and the problem the model is trying to solve.

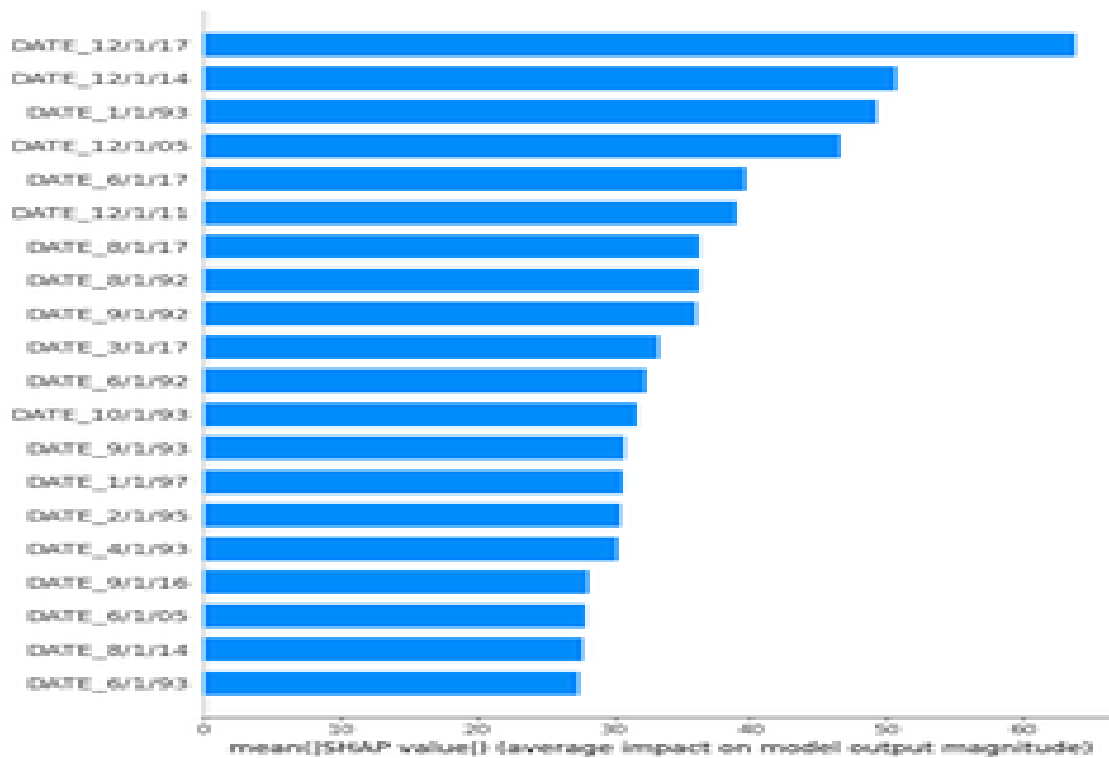
Next Steps:

1. **Investigate for Data Leakage:** Carefully examine the data for potential leakage, where information from the target variable might be indirectly included in the features. This can lead to unrealistically high performance.

2. Consider Different Models: While this model appears accurate, explore other machine learning models to compare performance and ensure you're not overfitting.

3. Analyze Feature Importance: Investigate why these specific dates are so important. Are there any events or patterns associated with them? This can provide valuable insights into the underlying data and improve the model's generalizability.

SHAP and LIME Visualizations



Local explanation

