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ABSTRACT

This project aimed to enhance Samsung's after-sales support services for portable devices like smartphones, tablets, and digital watches. By leveraging machine learning techniques, we developed predictive algorithms using four years of malfunction data.

OBJECTIVES

Improve Customer Satisfaction

Operational Efficiency

Integration Flexibility

PROJECT DETAILS

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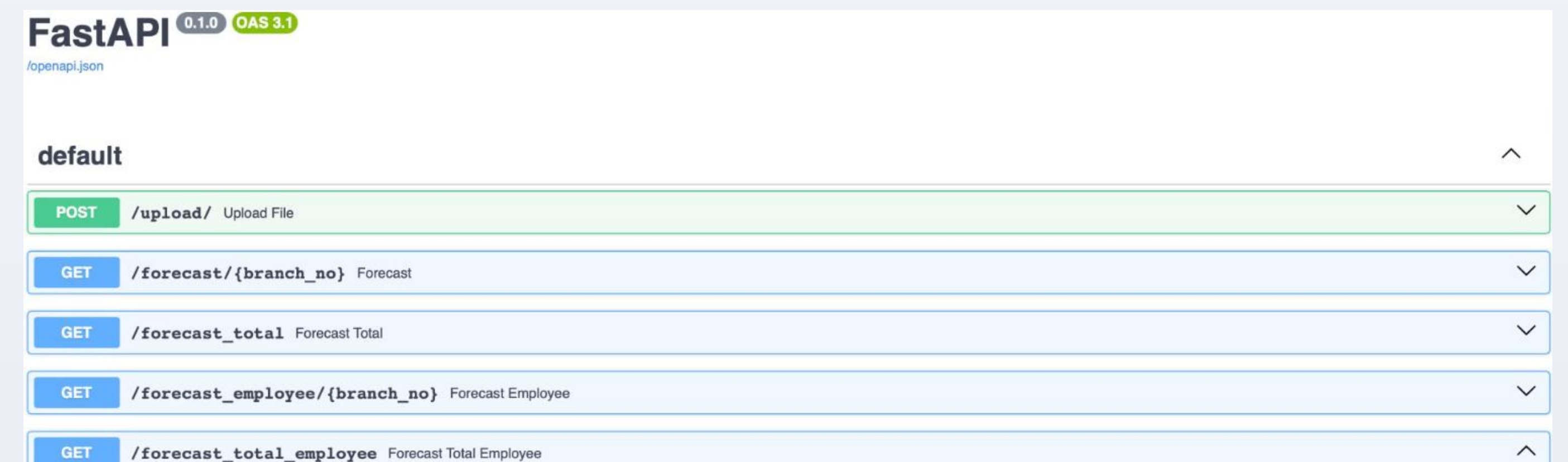
model = "ETS"
values = forecast_ets[-6:]
rmse < ets_rmse and arima_rmse < lstm_rmse and arima_rmse < gru_rmse:
ed_model = "ARIMA"
ted values = forecast_arima[-6:]
rmse < ets_rmse and lstm_rmse < gru_rmse:
ed_model = "LSTM"
ted values = forecasted_values[:5]
rmse < ets_rmse and gru_rmse < lstm_rmse:
ed_model = "GRU"
ted values = gru_forecasted_values[:5]
total_cases_next_week = forecasted_values[:1]
total_cases_next_week_df = pd.DataFrame(forecasted_total_cases_next_week)
total_cases_next_week_df.reset_index(drop=True, inplace=True)
total_cases_next_week_df.index = forecasted_total_cases_next_week_df.index.astype('int64')
counts = df['Model Kategorisi'].value_counts()
proportions = category_counts / category_counts.sum()
proportions = category_proportions.reset_index(drop=True)
total_cases_next_week_df[0] = forecasted_total_cases_next_week_df[0].reindex(category_proportions.index, fill_value=0)
cases_by_category = []
proportion in category_proportions.items():
ted_cases = forecasted_total_cases_next_week_df[0] * proportion
ted_cases_by_category.append((index, estimated_cases[0]))
    
```

Data Preprocessing and Model Selection: The process started with converting date strings to DateTime objects and removing of NaN values. 4 models were used: Long Short-Term Memory (LSTM) to handle complex dependencies, ARIMA for seasonal trends and Exponential Smoothing (ETS) for adaptability and GRU. They were each trained on 80% of the data with the remaining 20% serving as test set so that we could make accurate predictions.

PROJECT DETAILS II

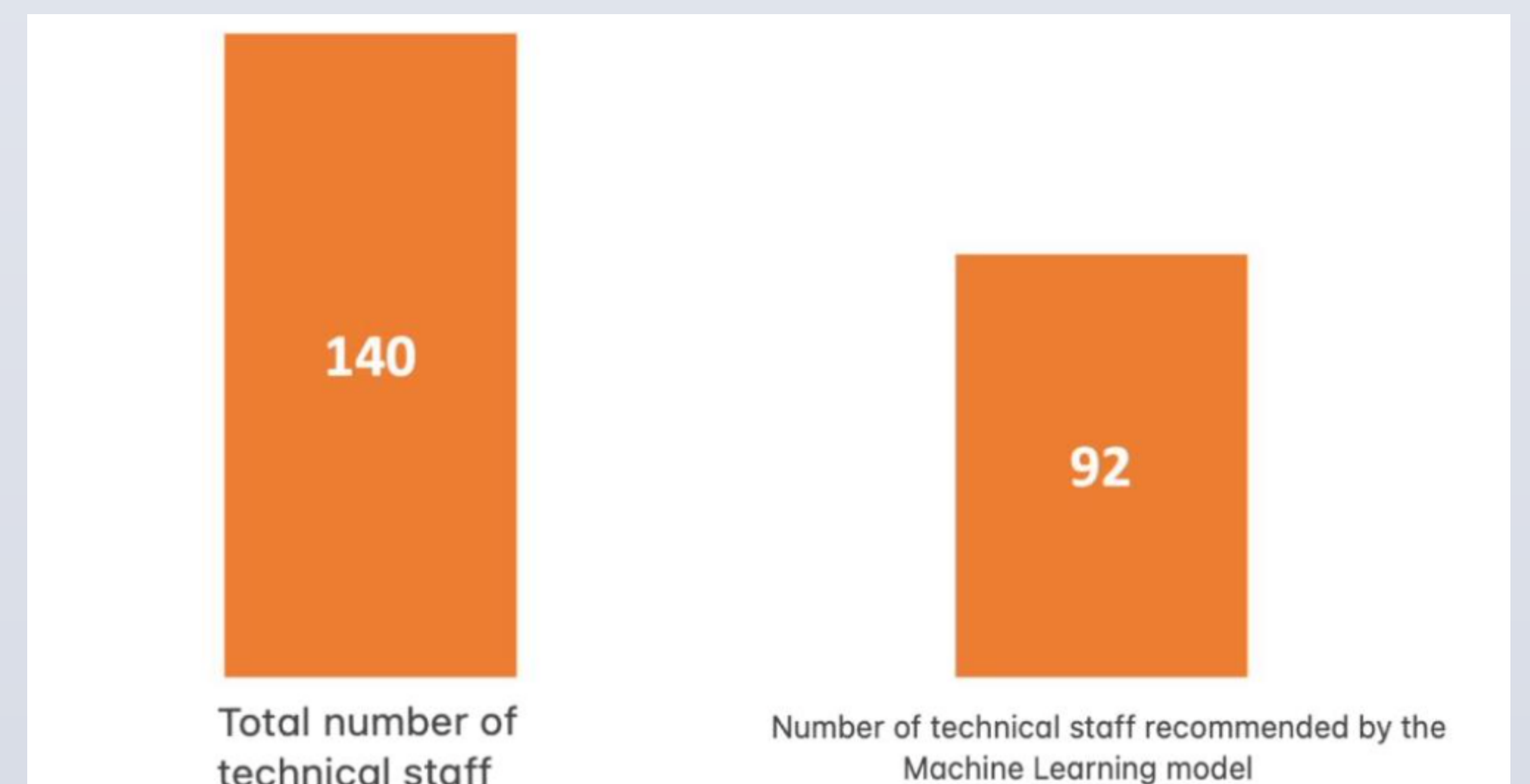
An API was developed to integrate our predictive models into the company's system, simplifying the use of forecasts. This API includes functions for uploading new data, predicting malfunctions for individual branches and all branches combined, and estimating the number of employees needed at specific branches.

This integration facilitates better resource management and more effective planning for service needs.



CONCLUSIONS

The project provided valuable insights into Samsung's after-sales support services. Using machine learning algorithms and predictive analytics, we created a framework to accurately forecast demand and optimize staffing levels across branches. This ensured that Samsung's repair facilities are well-staffed to meet customer needs. At the end, it was found that 92 employees were enough across branches while the actual number is 140. The end result shows the value of decision-making in workforce management with respect to data.



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