OPEN IIT
DATA ANALYTICS

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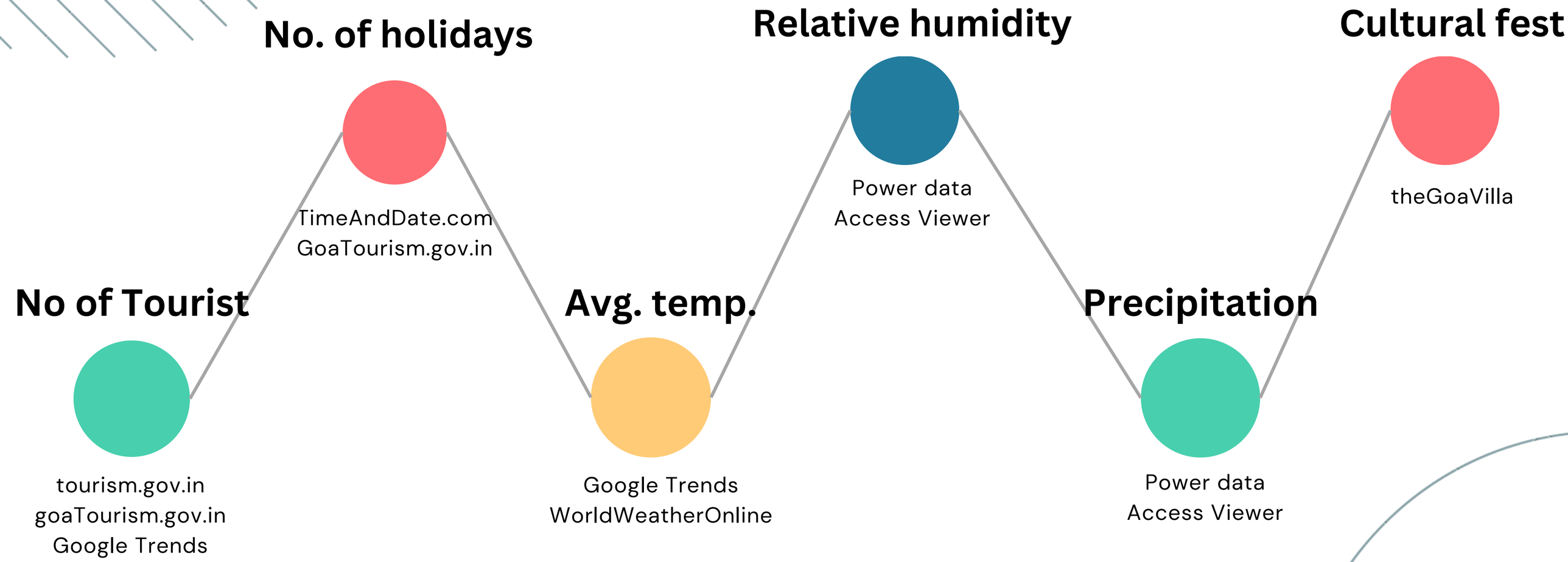
DATA ANALYSIS

PROBLEM STATEMENT

PREDICTING TOURIST ARRIVALS USING MACHINE LEARNING AND INTERNET SEARCH INDEX

DATA RESOURCES

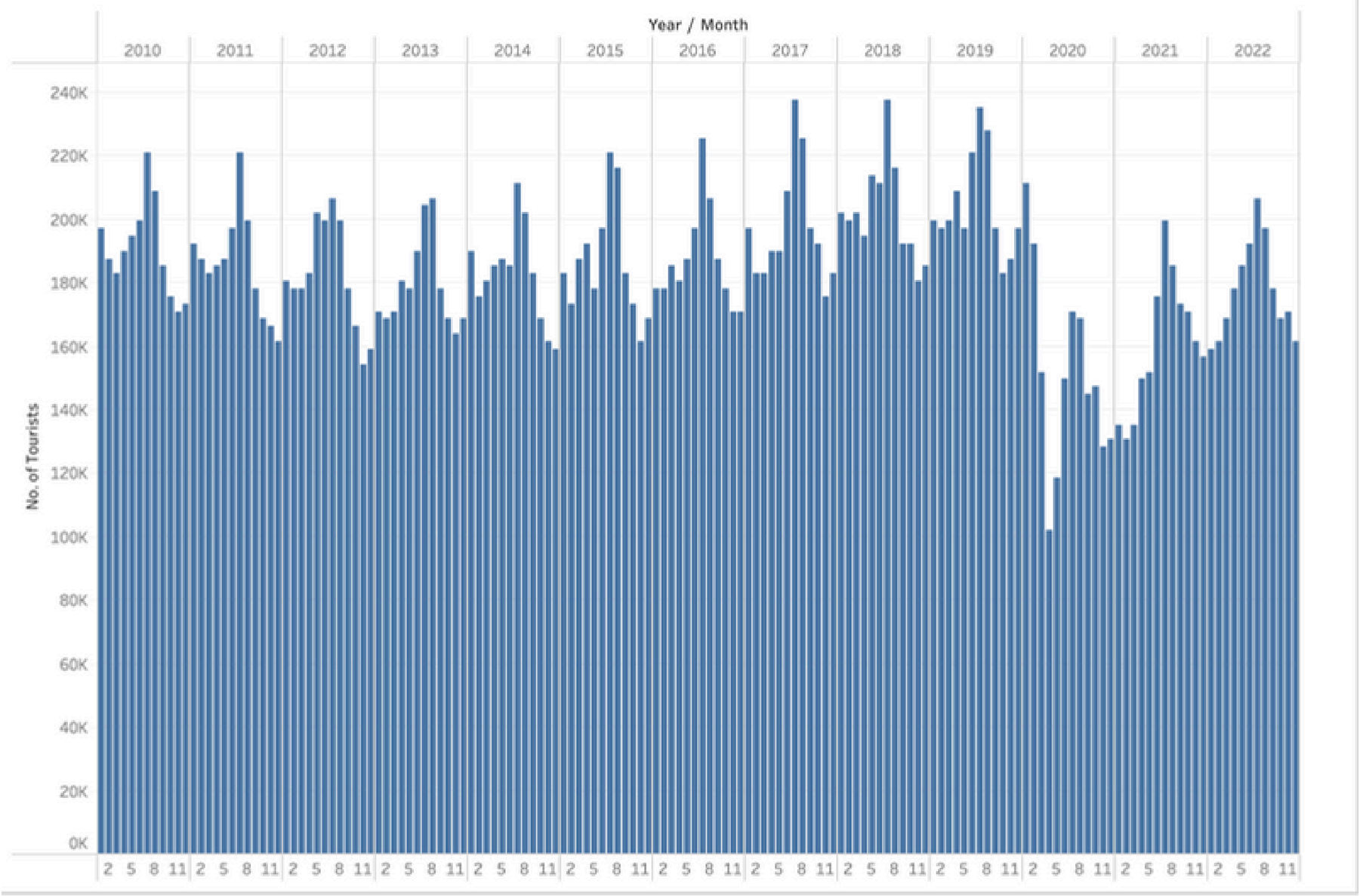


CREATED DATA

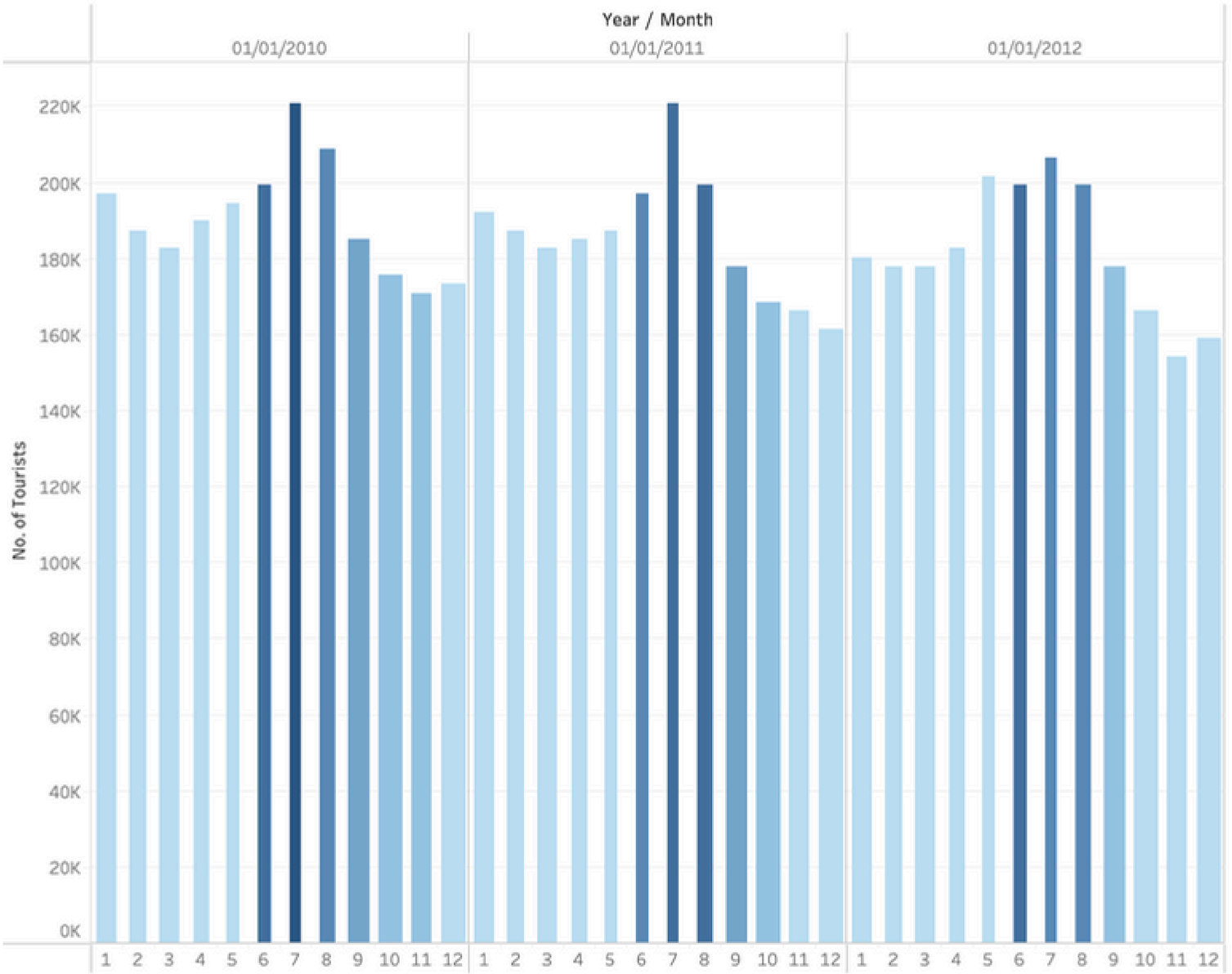
	Year	Month	Relative	Percentage	No. of Tourists	Holidays	Avg Temp(°C)	Relative Humidity(at 2m)%	Precipitation (mm/day)	Cultural Fests	GDP of goa (k)
0	2010	1	83	0.006885	197054.6125	9	27	63.44	0.00	7	54835.000
1	2010	2	79	0.006553	187558.0046	8	27	61.88	0.00	6	54835.000
2	2010	3	77	0.006387	182809.7007	9	28	64.56	0.00	4	54835.000
3	2010	4	80	0.006636	189932.1566	7	30	70.00	0.00	5	54835.000
4	2010	5	82	0.006802	194680.4605	6	30	73.62	0.00	4	54835.000
5	2010	6	84	0.006967	199428.7644	6	27	82.56	21.09	5	54835.000
6	2010	7	93	0.007714	220796.1321	5	26	88.19	26.37	3	54835.000
7	2010	8	88	0.007299	208925.3723	7	26	89.19	15.82	5	54835.000
8	2010	9	78	0.006470	185183.8527	10	26	86.31	10.55	2	54835.000
9	2010	10	74	0.006138	175687.2449	11	26	82.44	5.27	3	54835.000
10	2010	11	72	0.005972	170938.9409	9	26	80.69	5.27	6	54835.000
11	2010	12	73	0.006055	173313.0929	11	25	69.75	0.00	7	54835.000
12	2011	1	81	0.006719	192306.3086	9	26	61.75	0.00	7	289191.045
13	2011	2	79	0.006553	187558.0046	8	26	61.75	0.00	6	289191.045
14	2011	3	77	0.006387	182809.7007	9	27	64.88	0.00	4	289191.045

EXPLORATORY DATA ANALYSIS (EDA)

No of Tourists per Month

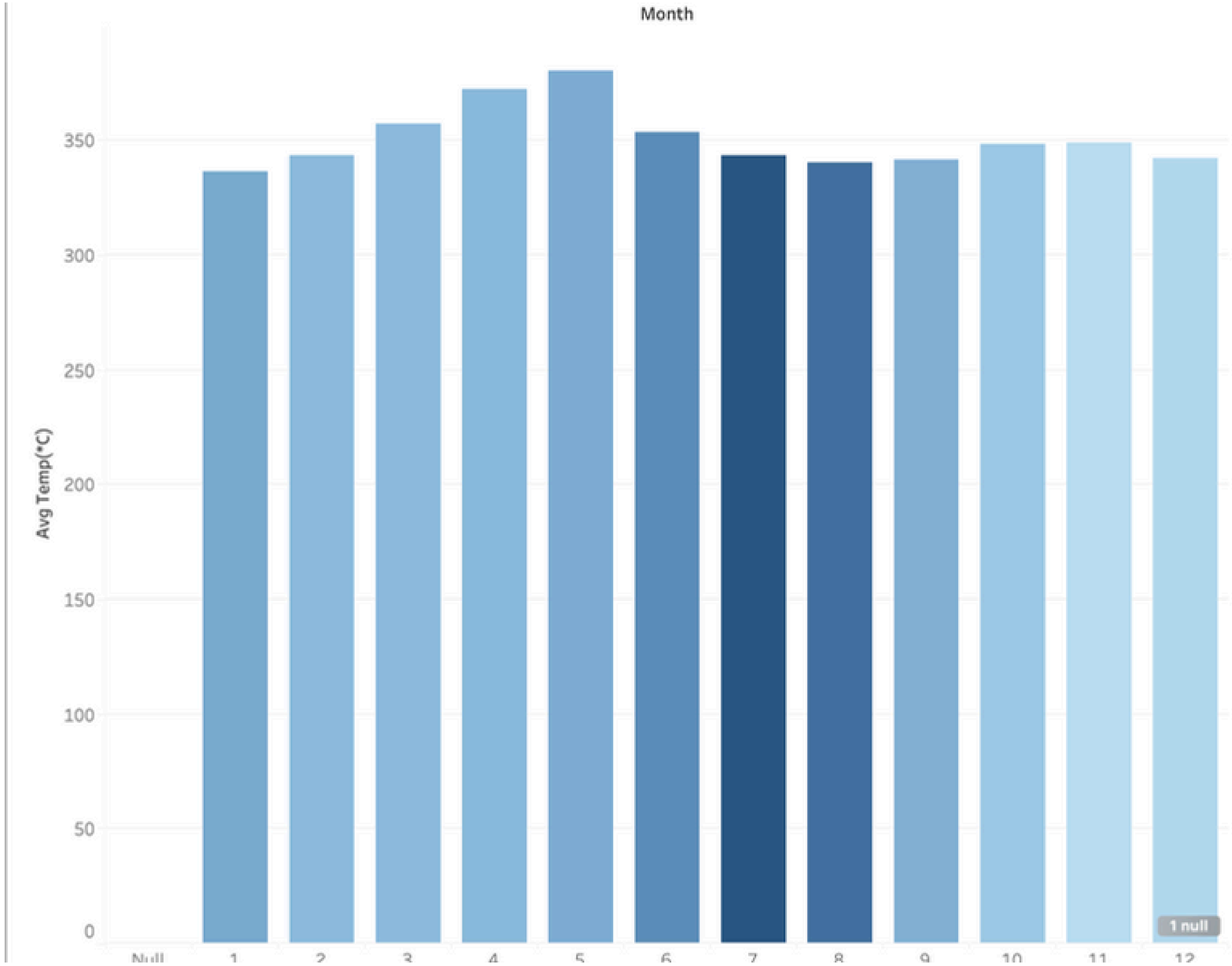


No of Holidays and Precipitation



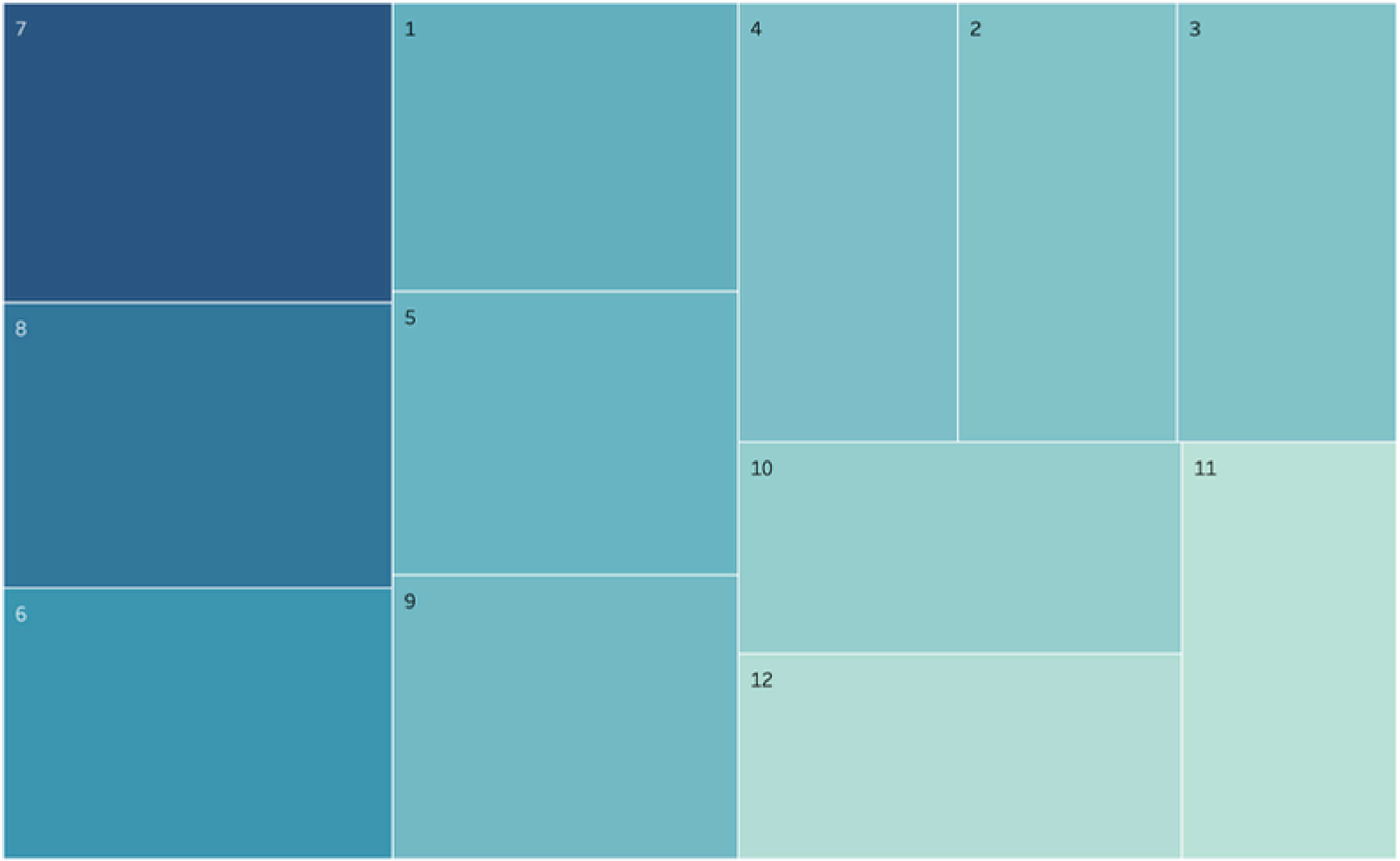
- Darkness: Precipitation
- Thickness: No of Holidays

Avg Temperature and Tourists



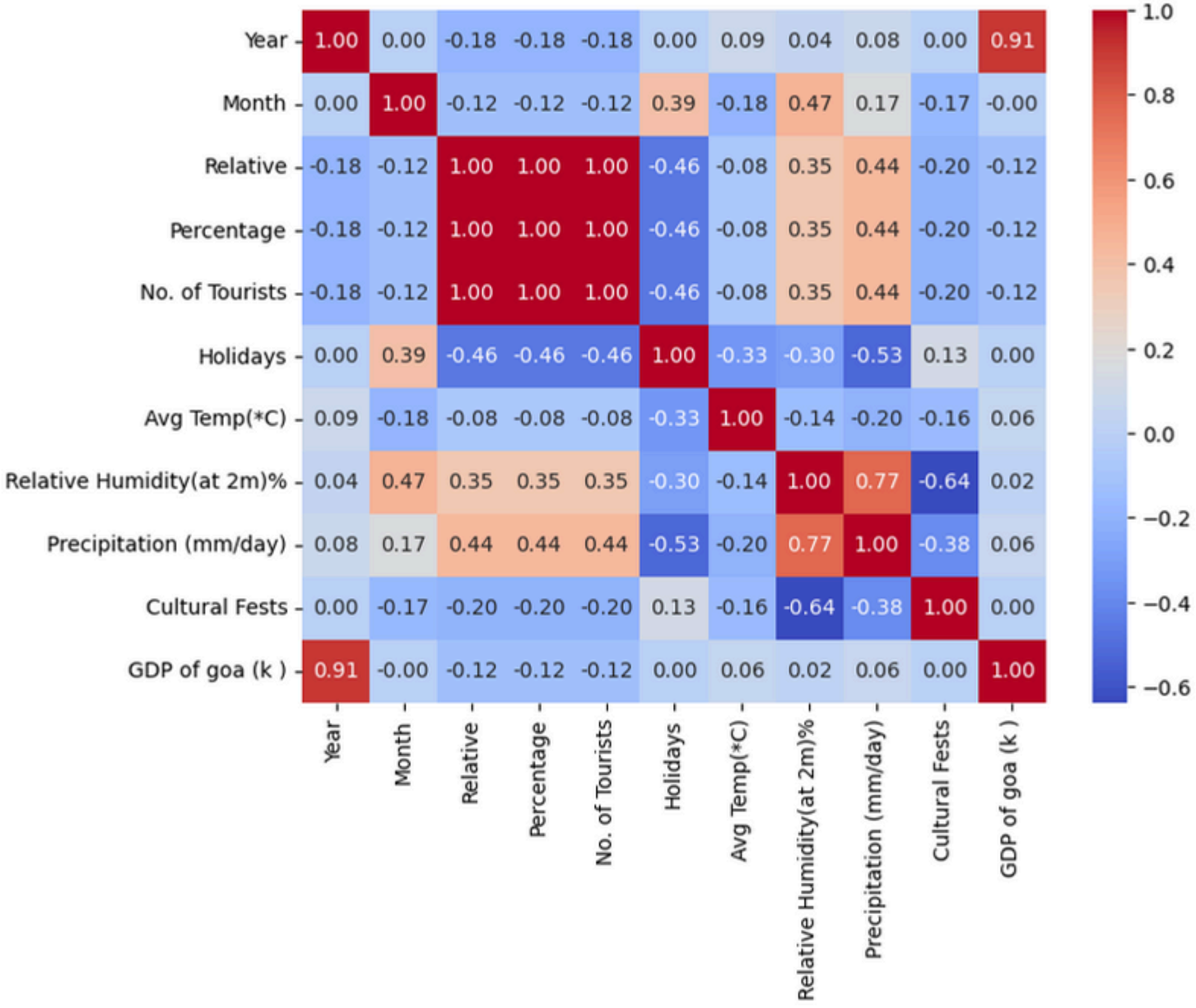
- Darkness: No of Tourists

Box Plot

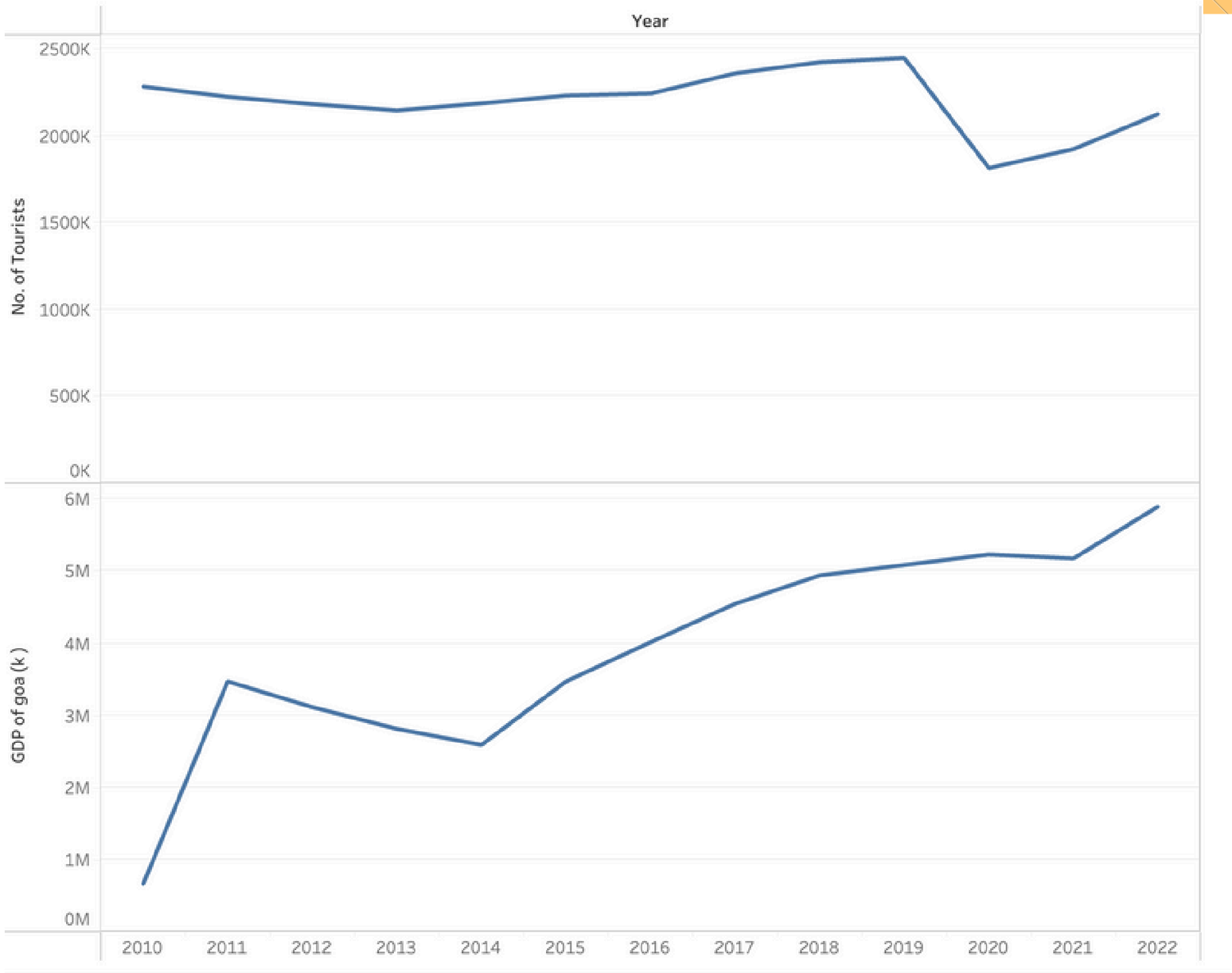


- Area: No of Tourists
- Darkness: No of Tourists

Correlation Matrix



Goa’s Tourism and GDP



OBSERVATION

- Tourist fluctuates monthly, with peak visitors in June-July- August.
- People prefer visiting during more humid and low-temperature season
- The charm of tourism rises when holidays fall.
- No direct relation was observed between GDP and tourism
- Even Cultural Fest doesn’t seem to affect tourism much
- During Covid, a sudden decrease in volume was observed but still, the trend remains the same.

ML MODELS

VECTOR AUTOREGRESSIVE AND PROPHET MODEL

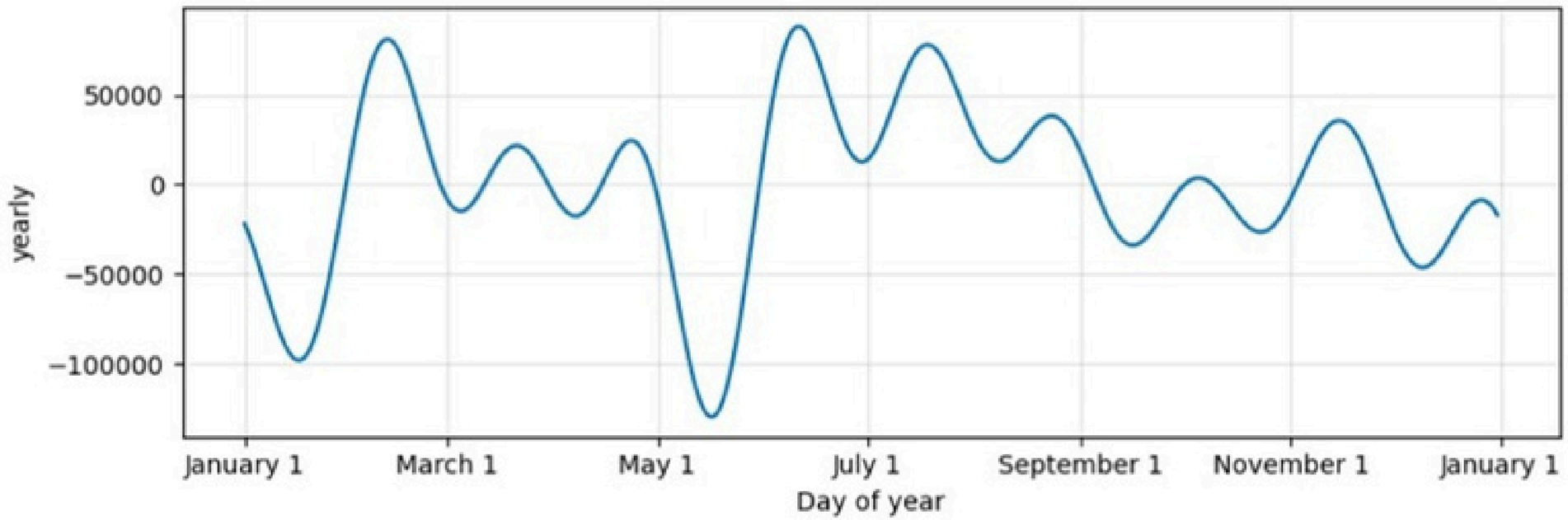
Vector Autoregressive (VAR)

Vector Autoregressive is a statistical and time-series analysis model used for analyzing and forecasting multivariate time series data. It's a type of autoregressive model that deals with multiple time series variables simultaneously.

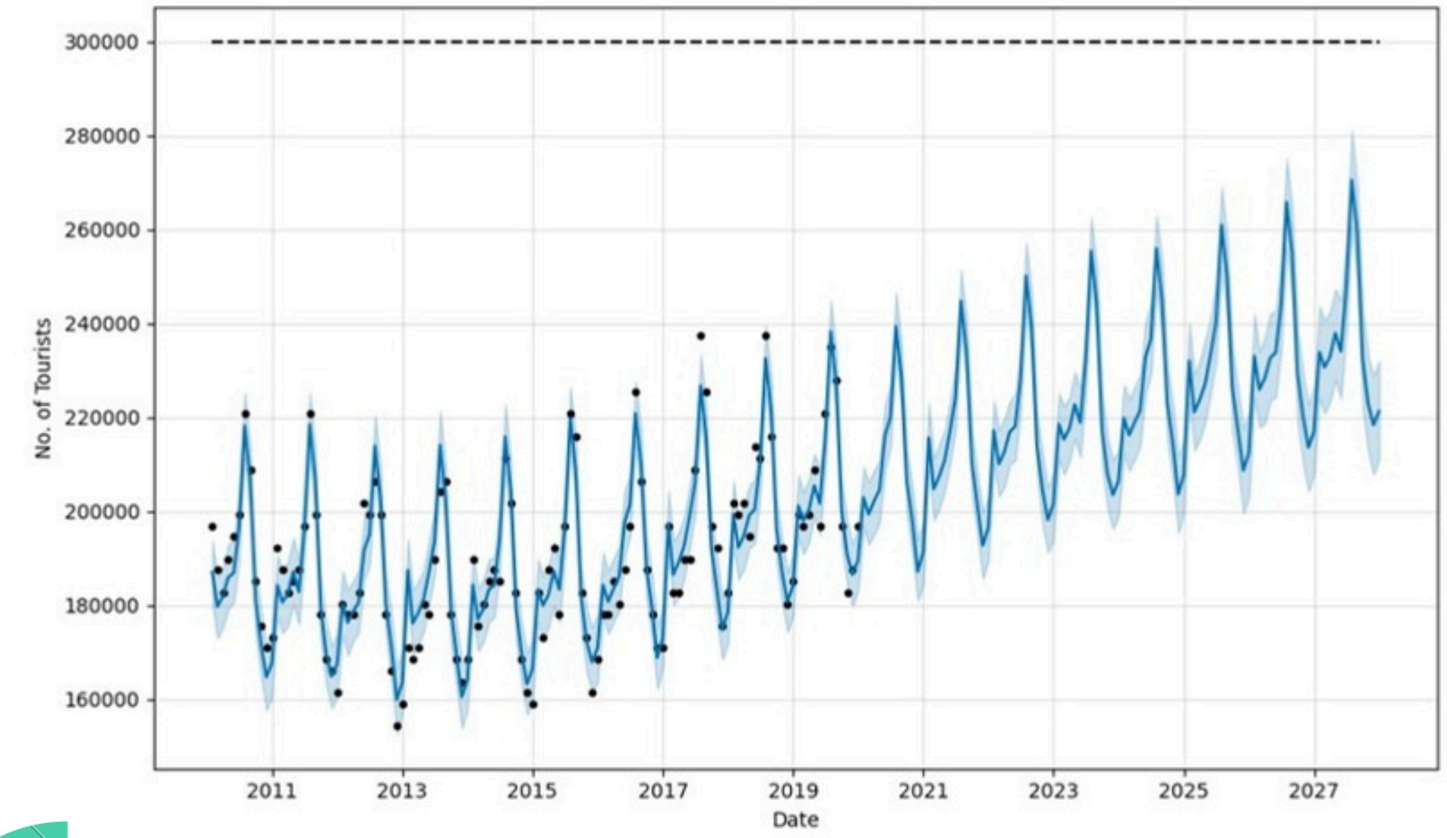
Prophet Model

The Prophet model is a forecasting tool developed by Facebook's Core Data Science team, designed to make time series forecasting more accessible and straightforward for non-experts. It is particularly well-suited for applications in business and economics, where historical data is available and seasonality and holidays play a significant role in forecasting.

Prophet Model
Monthly Trend Analysis



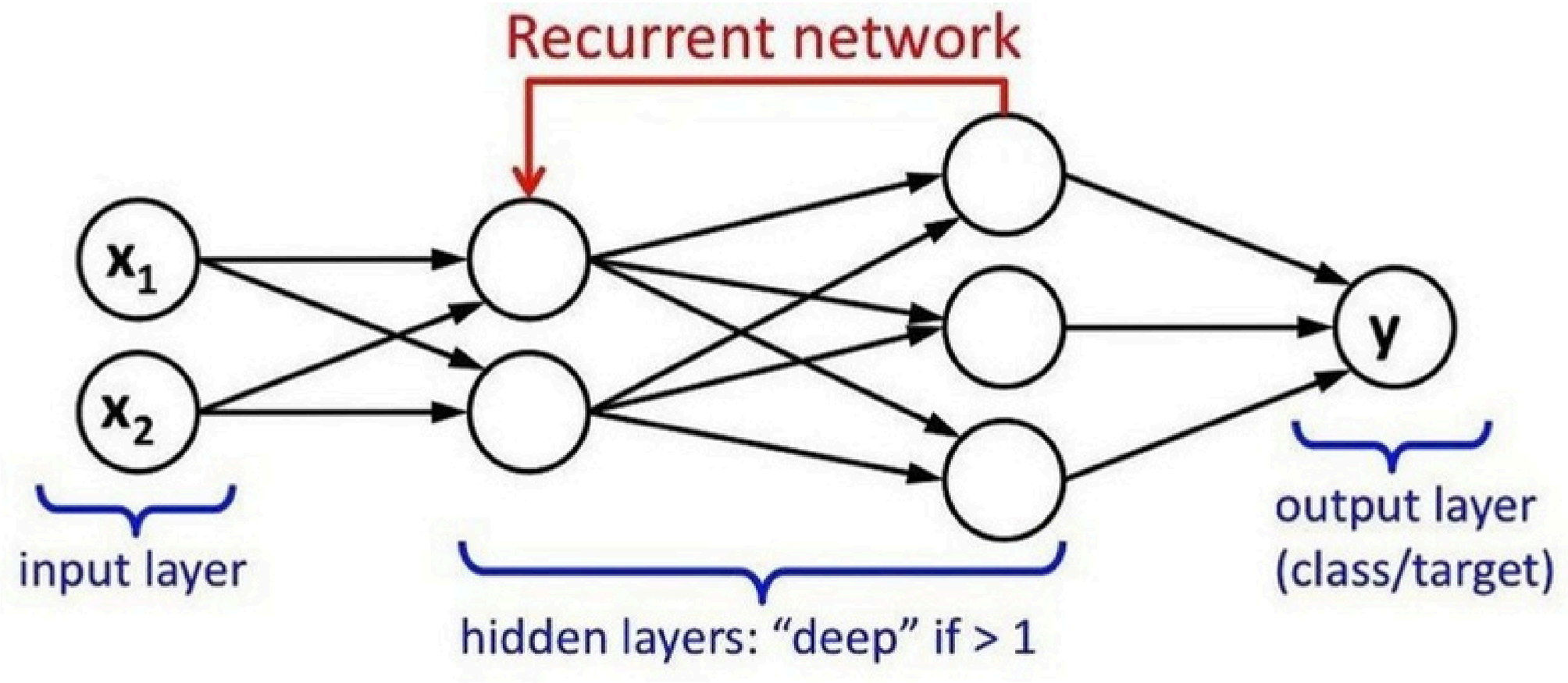
Prophet Model
Yearly Trend Analysis



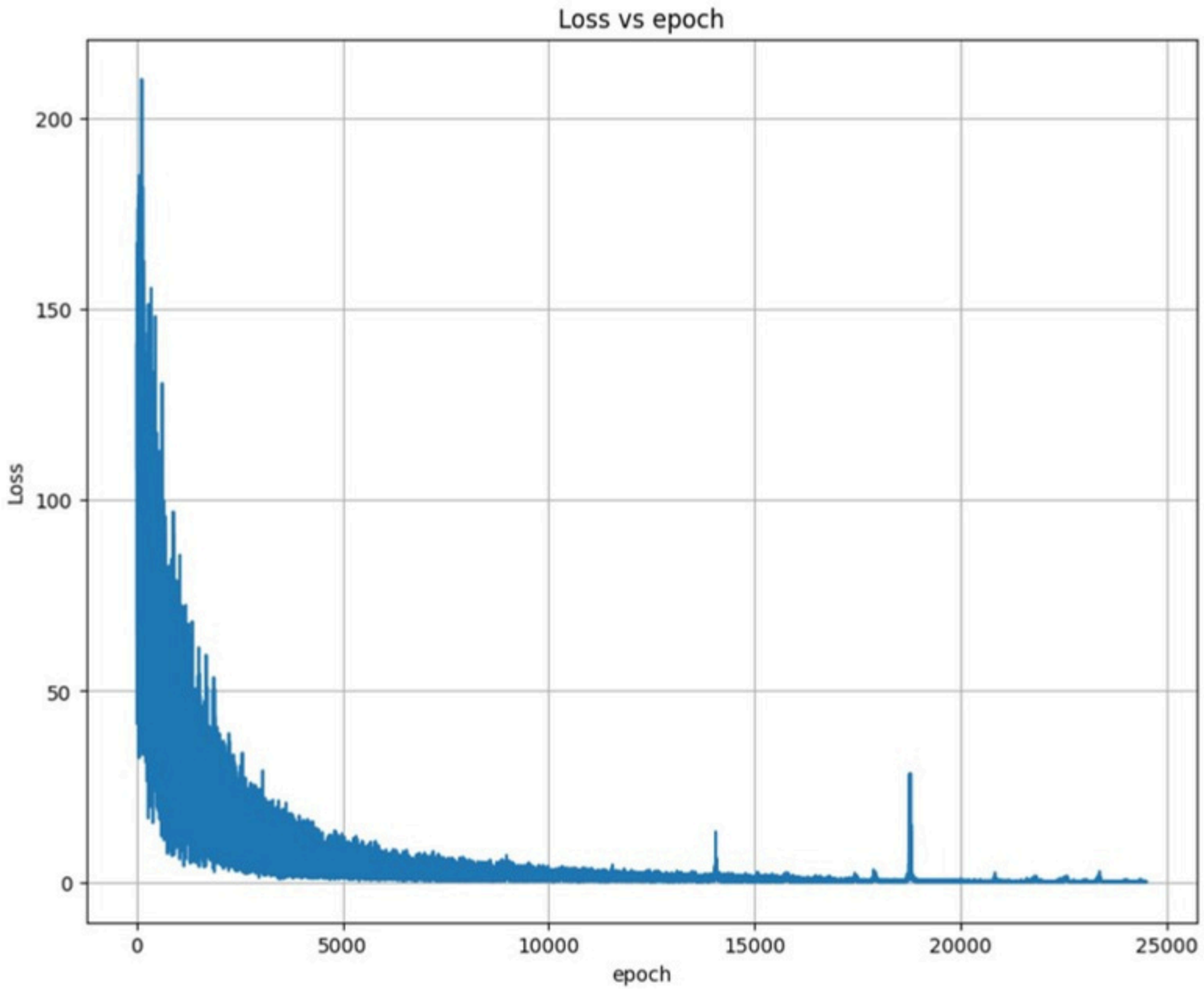
DEEP LEARNING MODEL

RECURRENT NEURAL NETWORK

Our Model


Recurrent network
x_1
x_2
y
input layer
hidden layers: “deep” if > 1
output layer
(class/target)

Training Loss vs Epoch



RESULTS

Model	MSE	Accuracy
VAR (monthly)	2167.44	97.83
VAR (yearly)	16556.51	83.44
Prophet (monthly)	9528.22	94.45
Prophet (yearly)	10045.56	90.54
RNN model	0.34	95.67

MSE -> Mean Squared Error
MAPE -> Mean Absolute Percentage Error

THANK YOU