- For companies to become competitive and skyrocket their growth, they need to leverage AI/ML to develop predictive models to forecast sales in the future.
- Predictive models attempt at forecasting future sales based on historical data while taking into account seasonality effects, demand, holidays, promotions, and competition.
- In this project, you work as a data scientist in the sales department and the sales team provided you with data from 1115 stores.
- The objective is to predict future daily sales based on the features.
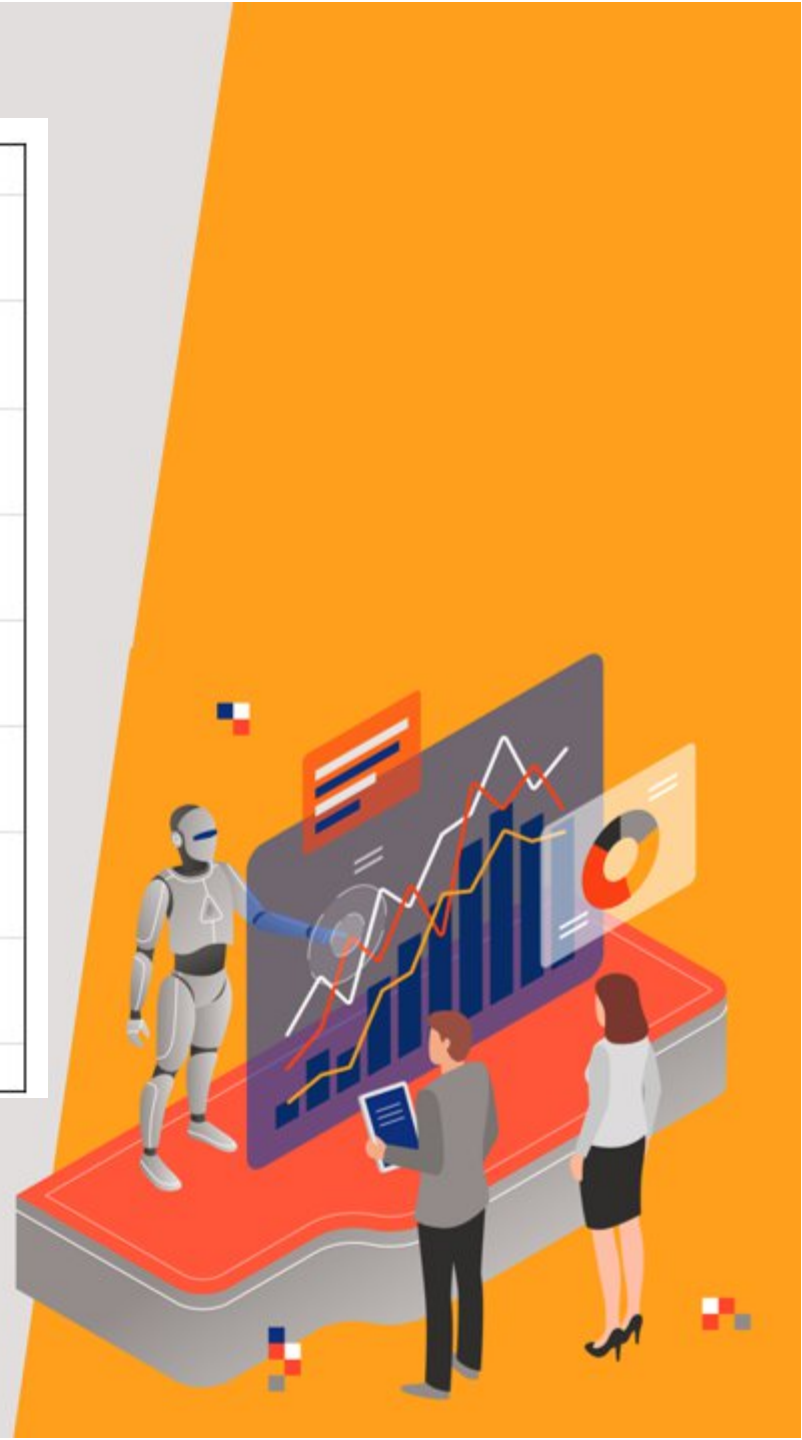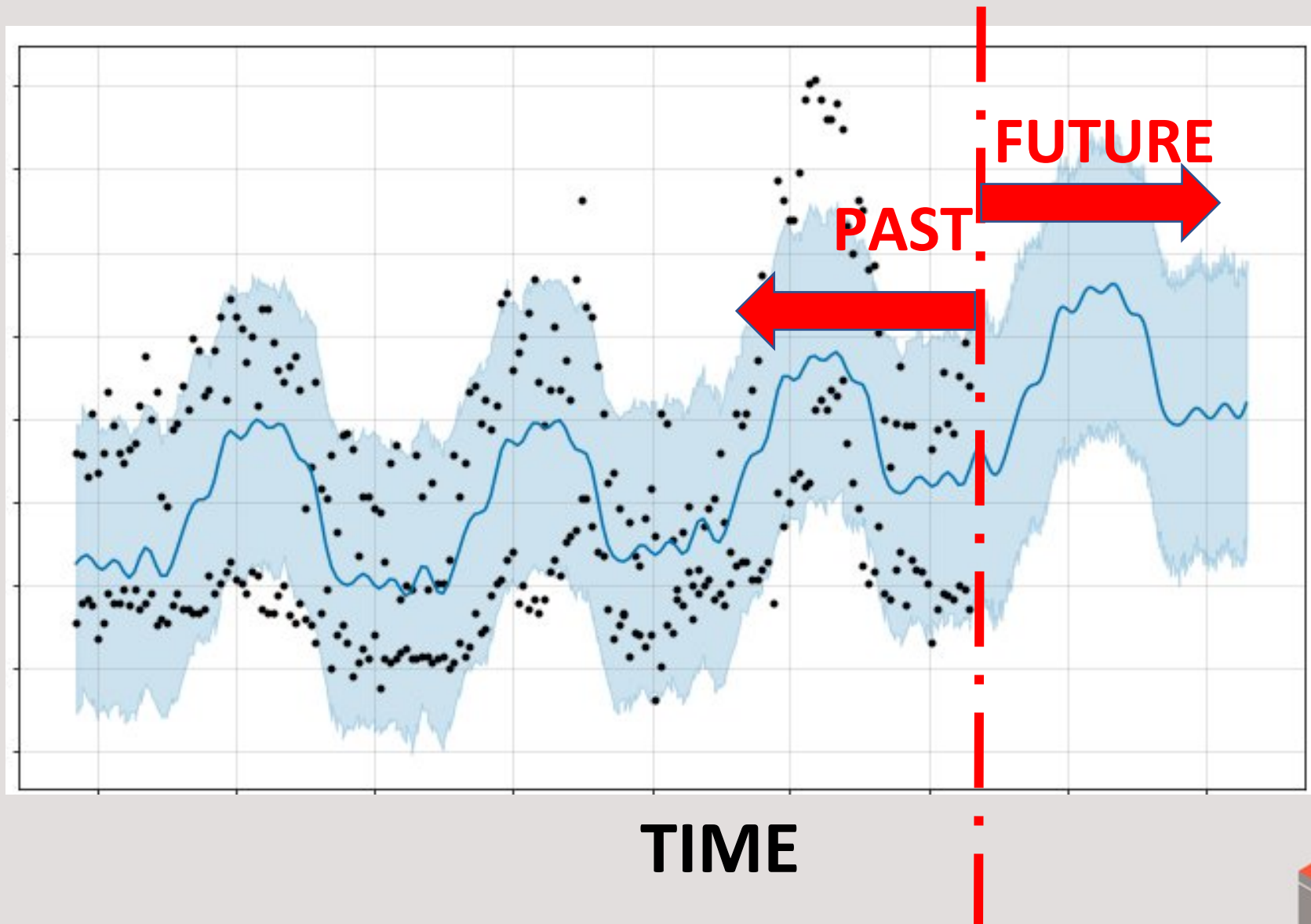
INPUTS AND EXPECTED OUTPUT

- **Id: transaction ID (combination of Store and date)**
- **Store: unique store Id**
- **Sales: sales/day, this is the target variable**
- **Customers: number of customers on a given day**
- **Open: Boolean to say whether a store is open or closed (0 = closed, 1 = open)**
- **Promo: describes if store is running a promo on that day or not**
- **StateHoliday: indicate which state holiday (a = public holiday, b = Easter holiday, c = Christmas, 0 = None)**
- **SchoolHoliday: indicates if the (Store, Date) was affected by the closure of public schools**

INPUTS AND EXPECTED OUTPUT

- **StoreType: categorical variable to indicate type of store (a, b, c, d)**
- **Assortment: a = basic, b = extra, c = extended**
- **CompetitionDistance (meters): distance to closest competitor store**
- **CompetitionOpenSince [Month/Year]: date when competition was open**

INPUTS AND EXPECTED OUTPUT

- **Promo2: Promo2 is a continuing and consecutive pro motion for some stores (0 = store is not participating, 1 = store is participating)**
- **Promo2Since [Year/Week]: date when store started par ticipating in Promo2**
- **PromoInterval: describes the consecutive intervals Pro mo2 is started, naming the months promotion is started anew. E.g. "Feb,May,Aug,Nov" me ans each round starts in February, May, August, Nove mber of any given year for that store**

FACEBOOK PROPHET

- **Prophet is open source software released by Facebook's Core Data Science team.**

- **Prophet is a procedure for forecasting time series data based on an additive model where non-linear trends are fit with yearly, weekly, and daily seasonality, plus holiday effects.**

- **Prophet works best with time series that have strong seasonal effects and several seasons of historical data.**

- **For more information, please check this out:**
  - **https://research.fb.com/prophet-forecasting-at-scale/**
  - **https://facebook.github.io/prophet/docs/quick_start.html#python-api**

FACEBOOK PROPHET

- **Prophet implements an additive regression model with four elements:**
  - **A piecewise linear, Prophet automatically picks up change points in the data and identifies any change in trends.**
  - **A yearly seasonal component modeled using Fourier series.**
  - **A weekly seasonal component.**
  - **A holiday list that can be manually provided.**
- **Additive Regression model takes the form:**

$$Y = \beta_0 + \sum_{j=1}^{p} f_j\left(X_j\right) + \epsilon$$

- **The functions $f_j(x_j)$ are unknown smoothing functions fit from the data**
- **Reference: https://research.fb.com/prophet-forecasting-at-scale/**

FACEBOOK PROPHET

ACCURATE AND FAST

- **Facebook teams uses Prophet for accurate forecasting and planning.**
- **Prophet can generate results in seconds.**

AUTOMATIC

- **No need to perform data preprocessing.**
- **Prophet works with missing data with several outliers.**

DOMAIN KNOWLEDGE INTEGRATION

- **Users can tweak forecast by manually adding domain specific knowledge.**