𝐓𝐢𝐦𝐞 𝐒𝐞𝐫𝐢𝐞𝐬 𝐀𝐧𝐚𝐥𝐲𝐬𝐢𝐬 𝐃𝐞𝐦𝐲𝐬𝐭𝐢𝐟𝐢𝐞𝐝: 𝐓𝐨𝐩 𝟐𝟎 𝐏𝐲𝐭𝐡𝐨𝐧 𝐋𝐢𝐛𝐫𝐚𝐫𝐢𝐞𝐬 𝐩𝐥𝐮𝐬 𝐓𝐲𝐩𝐞𝐬, 𝐀𝐩𝐩𝐥𝐢𝐜𝐚𝐭𝐢𝐨𝐧𝐬 𝐚𝐧𝐝 𝐅𝐮𝐧𝐜𝐭𝐢𝐨𝐧𝐬  
  
Time-series data is a sequence of data points collected over time intervals, allowing us to track changes over milliseconds, days, or even years.

**Applications**  
- Monitoring software systems: virtual machines, containers, services, applications  
- Monitoring physical systems: equipment, machinery, connected devices (IoT), our bodies  
- Asset tracking applications: vehicles, trucks, physical containers, pallets  
- Financial trading systems: classic securities, newer cryptocurrencies  
- Eventing applications: tracking user/customer interaction data  
- Business intelligence tools: tracking key metrics and the overall health of the business  
  
**Time Series Types**  
- 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞 Time Series: only one variable is varying over time.  
- 𝐌𝐮𝐥𝐭𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞 Time Series: multiple variables are varying over time.  
  
**Classical time-series forecasting approaches**  
1. Autoregression (AR): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
2. Moving Average (MA): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
3. Autoregressive Moving Average (ARMA): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
4. Autoregressive Integrated Moving Average (ARIMA): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
5. Seasonal Autoregressive Integrated Moving-Average (SARIMA): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
6. Seasonal Autoregressive Integrated Moving-Average with Exogenous Regressors (SARIMAX): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
7. Simple Exponential Smoothing (SES): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
8. Holt Winter’s Exponential Smoothing (HWES): 𝐔𝐧𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
9. Vector Autoregression (VAR): 𝐌𝐮𝐥𝐭𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
10. Vector Autoregression Moving-Average (VARMA): 𝐌𝐮𝐥𝐭𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
11. Vector Autoregression Moving-Average with Exogenous Regressors (VARMAX): 𝐌𝐮𝐥𝐭𝐢𝐯𝐚𝐫𝐢𝐚𝐭𝐞  
  
𝐈 𝐟𝐨𝐮𝐧𝐝 𝐭𝐡𝐞 𝐟𝐨𝐥𝐥𝐨𝐰𝐢𝐧𝐠 𝐋𝐢𝐛𝐫𝐚𝐫𝐢𝐞𝐬 for forecasting, anomaly detection, feature extraction, and machine learning 𝐨𝐧 𝐭𝐢𝐦𝐞-𝐬𝐞𝐫𝐢𝐞𝐬 𝐫𝐚𝐧𝐤𝐞𝐝 𝐛𝐚𝐬𝐞𝐝 𝐨𝐧 𝐆𝐢𝐭𝐡𝐮𝐛 𝐬𝐭𝐚𝐫𝐬 and project-quality score.

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| --- | --- | --- | --- | --- |
| Prophet | Sktime | tsfresh | NeuralProphet | STUMPY |
| pmdarima | tslearn | Darts | GluonTS | Pytorch-forecasting |
| Uber/orbit | pyts | NeuralForecast | Auto\_TS | seglearn |
| greykite | TSFEL | tick |  |  |