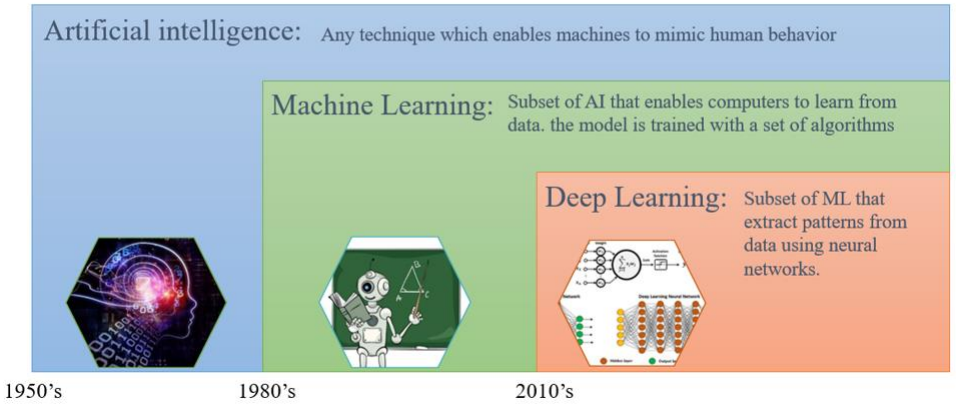
Module 5 – Part I
Machine Learning Fundamentals (review)



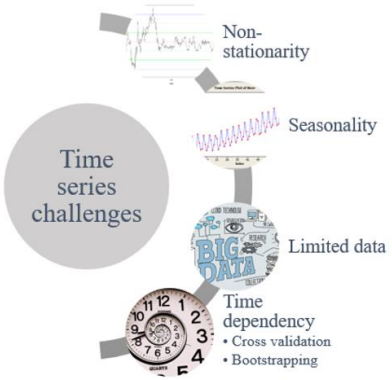
Module 5 – Part II
Machine Learning Boosting models

dmlc XGBoost

CatBoost

LightGBM

Module 5 – Part III
Challenges in Time Series Machine Learning



Module 5 – Part IV
Time Series Machine Learning in Python

Jon M. Huntsman School of Business
UtahStateUniversity

Pedram Jahangiry

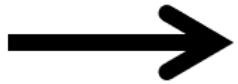
Road map!

- Module 1- Introduction to Deep Forecasting
- Module 2- Setting up Deep Forecasting Environment
- Module 3- Exponential Smoothing
- Module 4- ARIMA models
- Module 5- Machine Learning for Time series Forecasting
- Module 6- Deep Neural Networks
- Module 7- Deep Sequence Modeling (RNN, LSTM)
- Module 8- Prophet and Neural Prophet

Single-Output

	series
Train	y1
	y2
	y3
	y4
	y5
	.
	.
	.
	y130
	y131
	y132
Test	y133
	y134
	.
	.
	.
	y142
	y143
	y144

Tx = 2
Ty = 1



	X1	X2	Single output y
	y1	y2	y3
	y2	y3	y4
	y3	y4	y5
	y4	y5	y6
	y5	y6	y7
	.	.	.
	.	.	.
	y129	y130	y131
	y130	y131	y132
	y131	y132	y133
	y132	y133	y134
	.	.	.
	.	.	.
	.	.	.
	.		
	y141	y142	y143
	y142	y143	y144

Forecast	y143	y144	y145
	y144	y145	y146
	y145	y146	y147

train 132
test 12
total 144

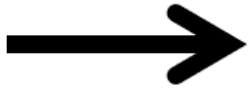
train 130
test 12
total 142

Multi-Output

	series
Train	y1
	y2
	y3
	y4
	y5
	.
	.
	.
	y130
	y131
	y132
Test	y133
	y134
	.
	.
	.
	y142
	y143
	y144

Tx = 2

Ty = 12



			Multi output				
	X1	X2	y	y	y	...	y
	y1	y2	y3	y4	y5	...	y14
	y2	y3	y4	y4	y4	..	y15
	y3	y4	y5	y5	y5	..	y16
	.	.	.	.	.	..	.
	.	.	.	.	.	..	.
	.	.	.	.	.	..	.
	.	.	.	.	.	..	.
	y130	y131	y132	y133	y134	..	y143
	y131	y132	y133	y134	y135	..	y144
Forecast	y143	y144	y145	y146	y147	...	y156

train 130

test 1

total 131

PYCARET

Module 5 – Part IV
Time Series Machine Learning in Python

JON M. HUNTSMAN SCHOOL OF BUSINESS
UtahStateUniversity

Pedram Jahangiry