Survival Analysis

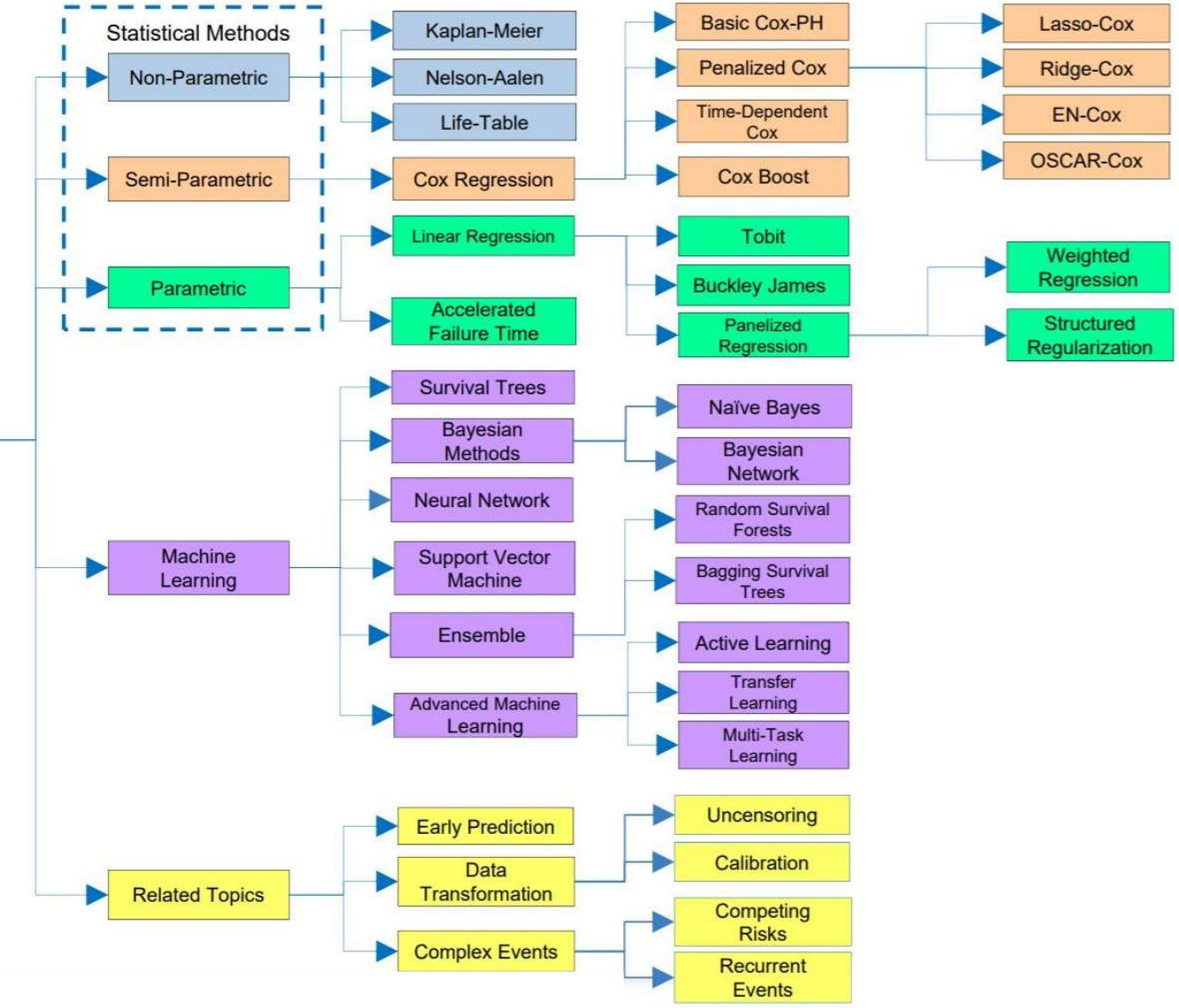
An Introduction

What is Survival Analysis? [1]

- Various statistical methods
- Used in medical, economic and scientific circumstances
- Estimates the time to **failure**

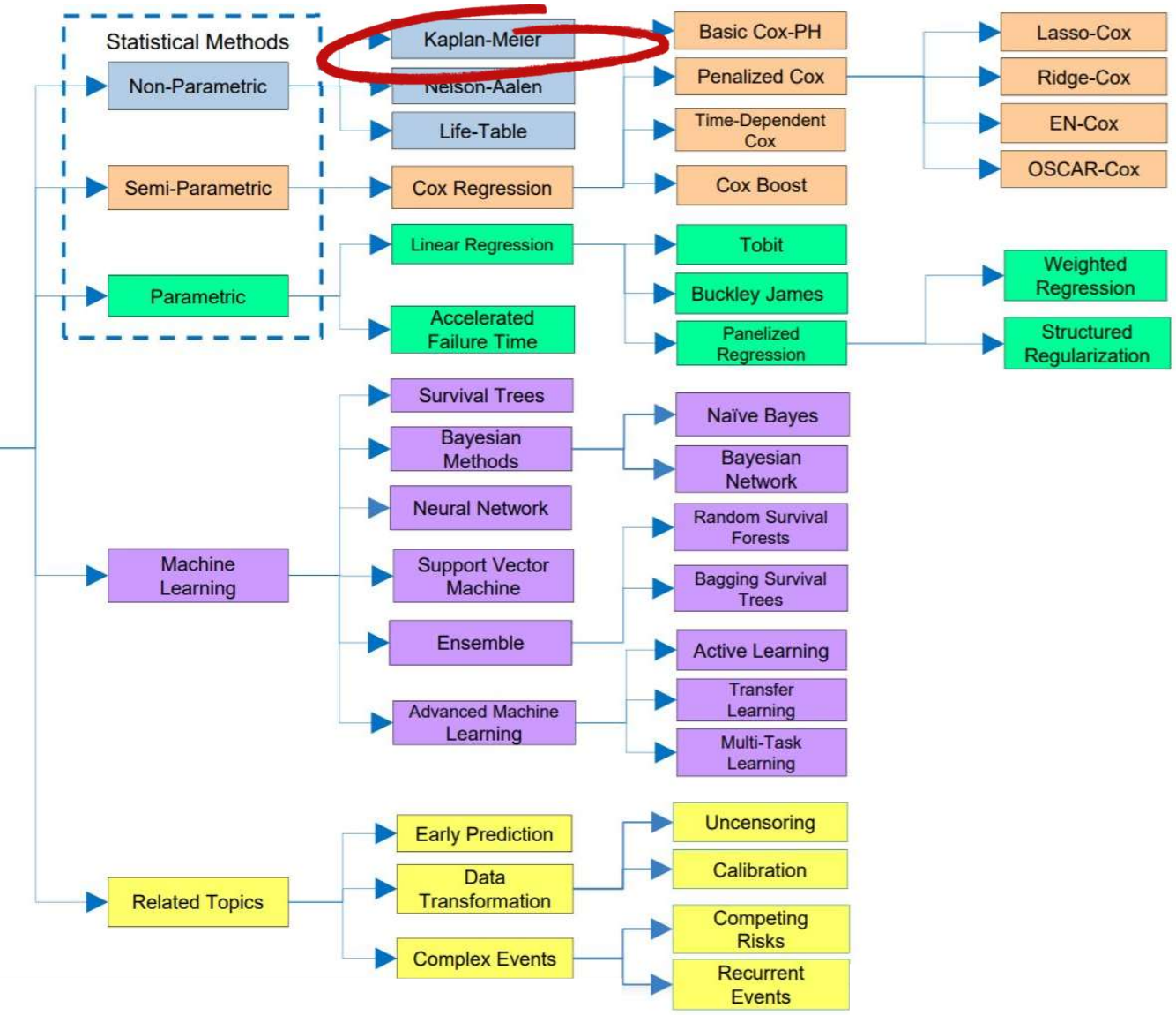
What is failure? [1]

- Event
- Does not have to be negative
- Examples…



Taxonomy

…of survival analysis techniques [2]



Taxonomy

…of survival analysis techniques [2]

$$\hat{S}(t) = \prod_{j:t_j \leq t} \frac{(r_j - d_j)}{r_j}, \text{ for } 0 \leq t \leq t^+$$

Table 1: Details for calculating Kaplan-Meier survival estimates as a function of time.

Time	Start	Fail	Censored	At risk	Surv prob	Cumulative survival
	n_j	d_j	w_j	r_i	$P_j = (r_j - d_j)/r_j$	$S_j = P_j \times P_{j-1}$
0	31	2	3	31 - 3 = 28	(28 - 2) / 28 = 0.93	0.93 × 1.00 = 0.93
1	26	1	2	26 - 2 = 24	(24 - 1) / 24 = 0.96	0.96 × 0.93 = 0.89
2	23	1	2	23 - 2 = 21	(21 - 1) / 21 = 0.95	0.95 × 0.89 = 0.85
3	20	1	2	20 - 2 = 18	(18 - 1) / 18 = 0.94	0.94 × 0.85 = 0.80
etc						

Taken from [1]

An example

Data from [3]

The data [3]

ID	Clinic	Status	Time	Prison	Dose
1	1	1	428	0	50
132	2	0	633	0	70
2	1	1	275	1	55
…					

Sources

- [1] Stevenson, Mark - "An introduction to survival analysis“
- [2] Reddy, Li – “Machine Learning for Survival Analysis”
- [3] Caplehorn, Batey – “Methadone Maintenance in Australia”
- https://github.com/CAJan93/survivalAnalysisDemo.git

Thanks for your attention