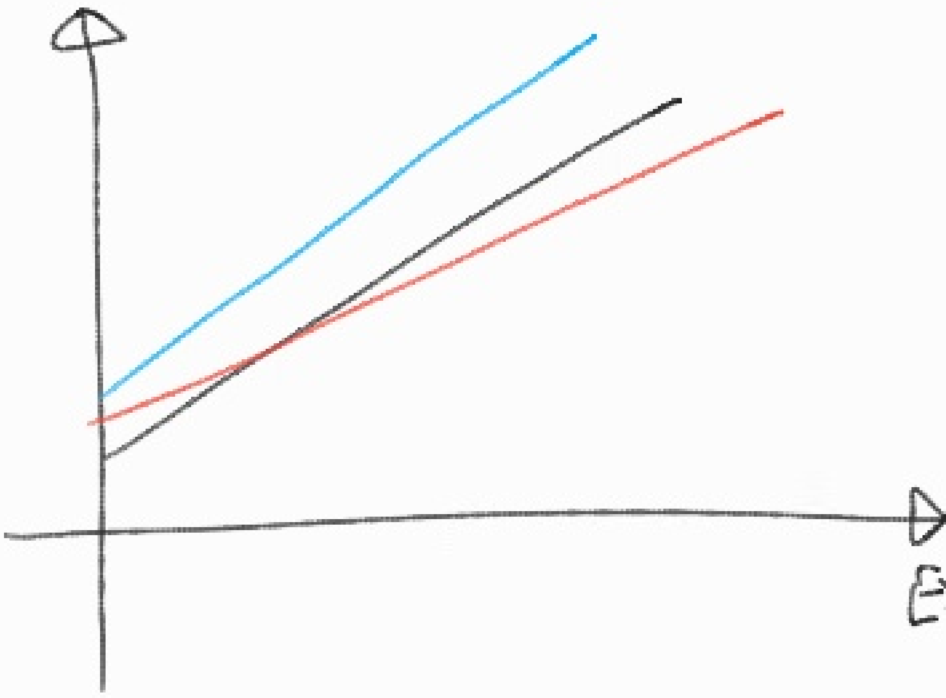
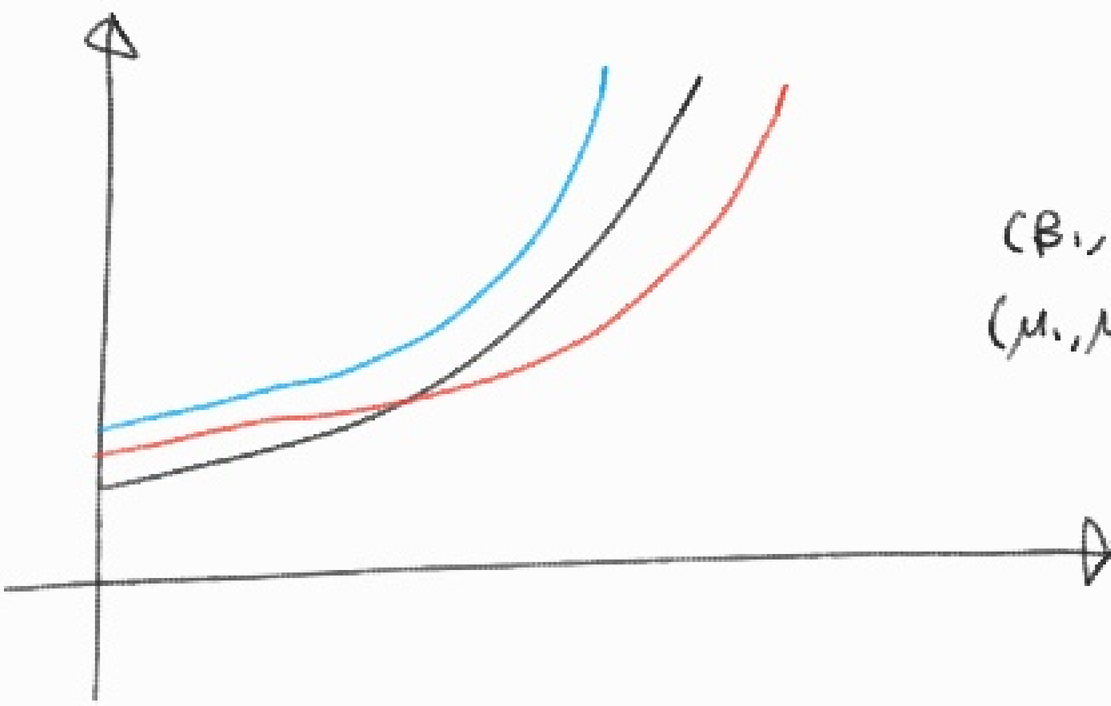
Linear



Exponential



$(\beta_1, \beta_2) \sim BN$
$(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho_{12})$

Key Assumptions:

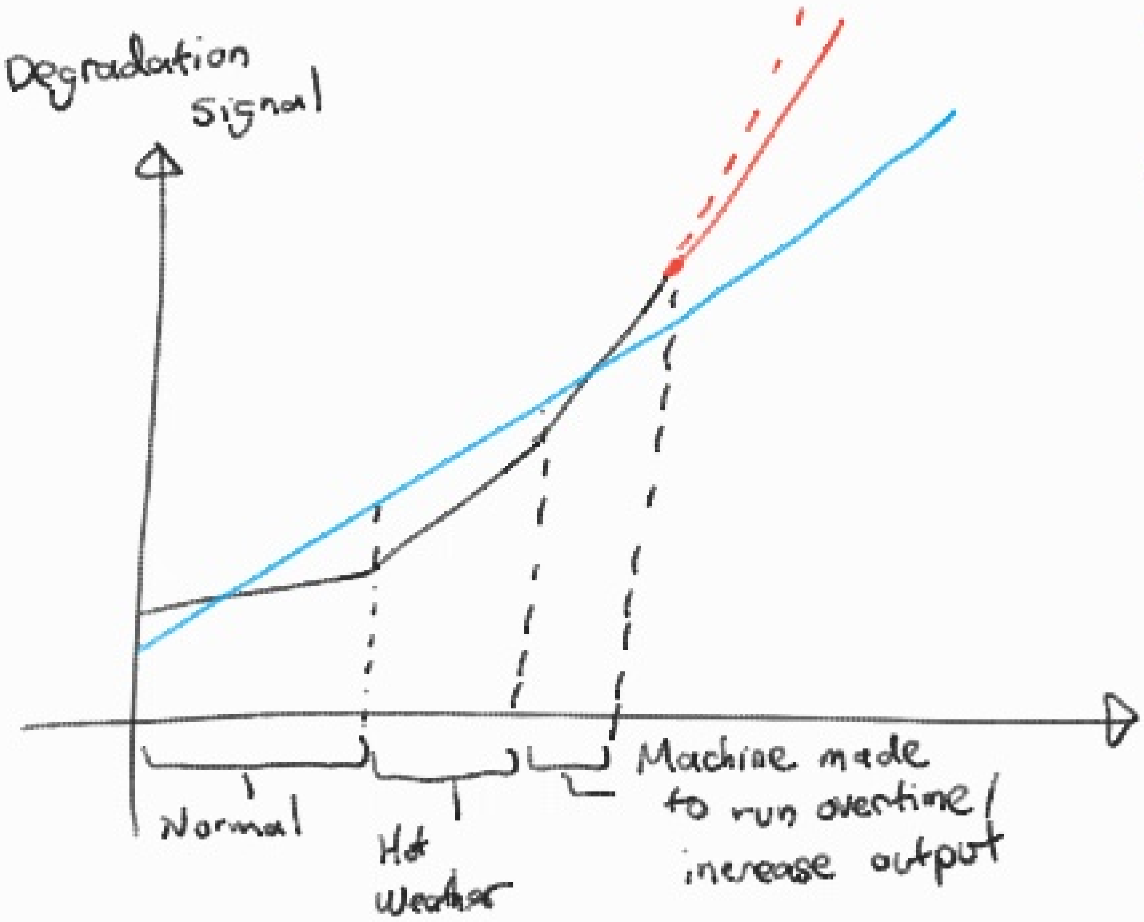
- Although "identical" components, slight manufacturing variations and/or differences in usage environments for each component results in different degradation patterns.

$\downarrow$

same type of underlying distribution, but different parameters for each component

- usage condition and degradation model for an individual is constant/unchanged for its lifetime/duration

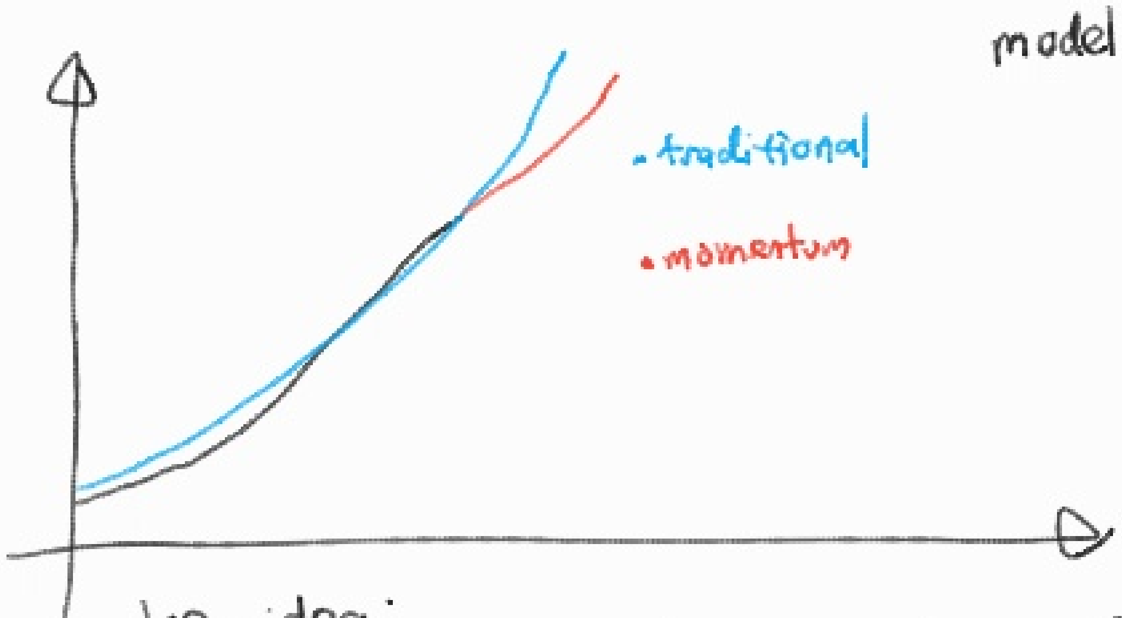
Adaptive Degradation Modelling



- traditional
- momentum
  - ~~Bayesian updating~~
  - 1st & 2nd derivative momentums
  - Moving average
  - Online learning / batch learning

degradation model or

- the rate of degradation for a single unit / realization might not constant throughout its lifespan



model
1. current state of degradation
2. current rate of degradation

Key idea:
The nature/parameters of the degradation of a single component's degradation might not be constant, and might change over time.
Need a framework for updating that gives more weight to recent data, and possibly ignore old data.

Advantages:

- Allows model to react/adapt to systemic changes to the nature/use/operation of a machine that would fundamentally change/disrupt the rate of its degradation.

Disadvantages:

- Highly overreactive & unstable in the presence of noise.
- Tuning hyperparameters is complicated.