4th UCAAT User Conference on Advanced Automated Testing

ETSI World Class Standards

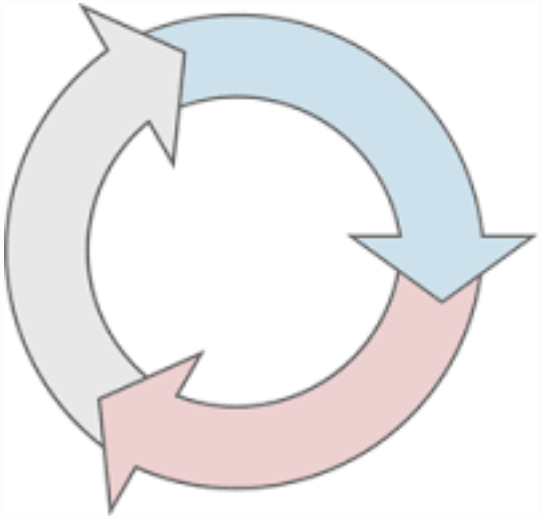
WHY TESTING AUTOMATION IS THE PERFECT DOMAIN FOR MACHINE LEARNING

Presented by Tamas Cser

functionize

AI – Man vs Machine

Machine Learning Opportunities



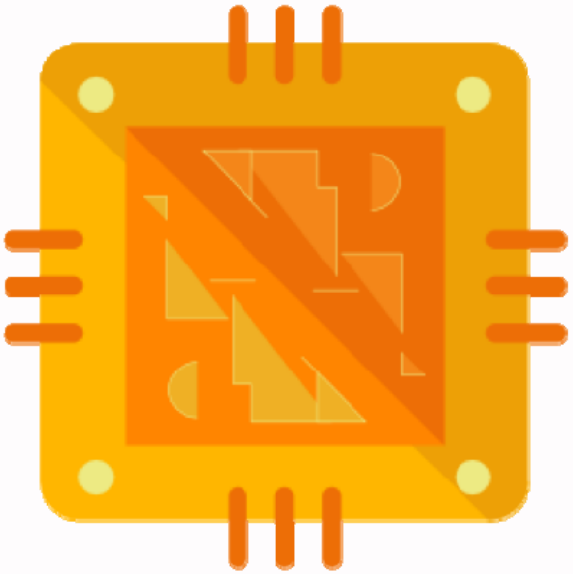
Current State

72%

AI in testing automation

Human Intelligence

Good for abstract feature identification, bad at scale.



Machine Intelligence

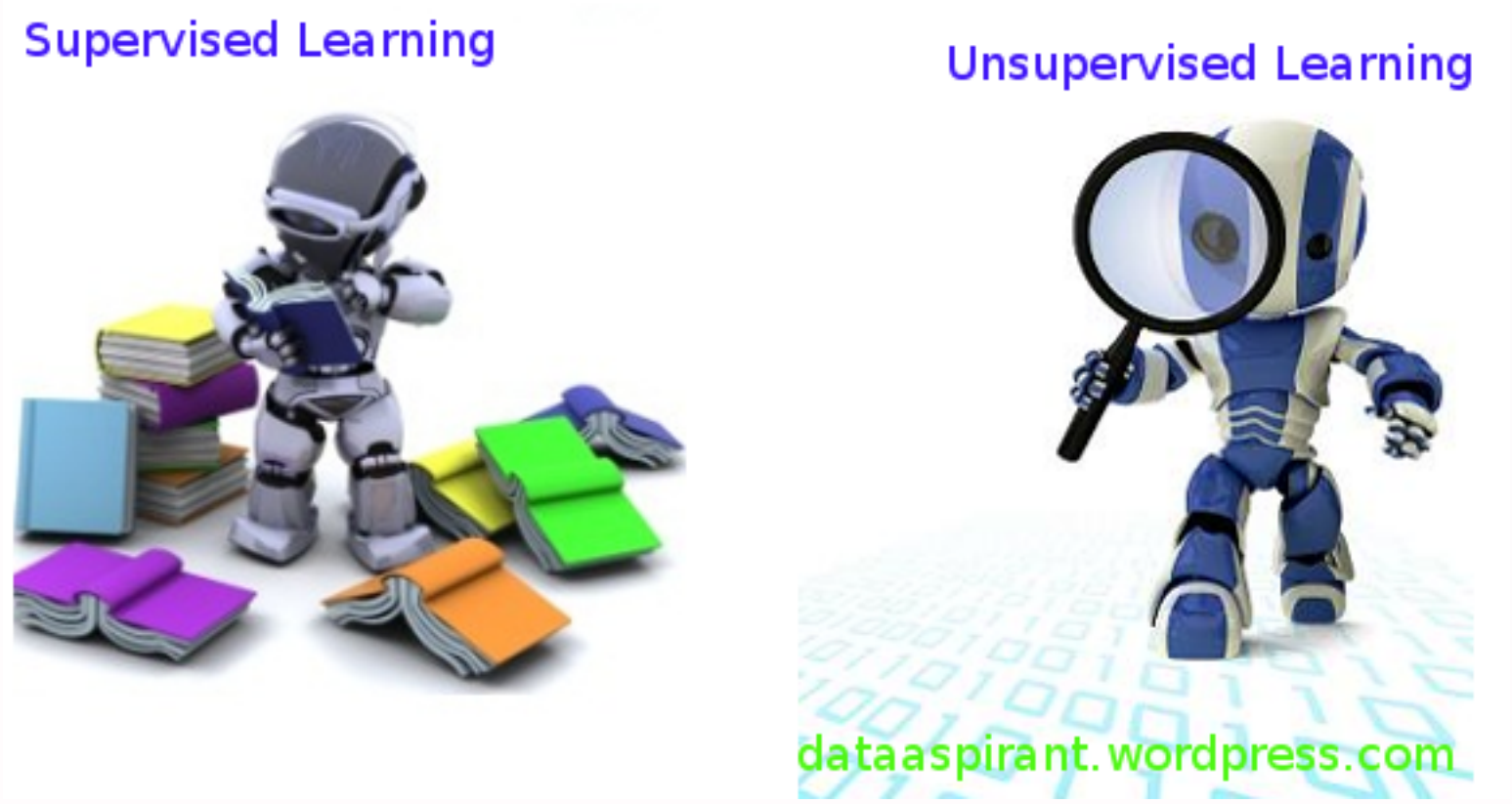
Great at scale, learning anomalies.

Detect Anomalies in Large Dynamic Data

Week 1:	Week 2:	Week 3:	Week 4:	
Results 1..5:	Results 1..5:	Results 1..5:	Results 1..5:	
Result A	Result B	Result A	Result B	
Result B	Result A	Result B	Result C	Anomaly
Result C	Result C	Result C	Result D	
Result D	Result D	Result D	Result E	
Result E	Result E	Result E	Result F	
etc.	etc.	etc.	etc.	

Fingerprint the data to determine numeric range for "normal"

SUVERVISED OR UNSUPERVISED?

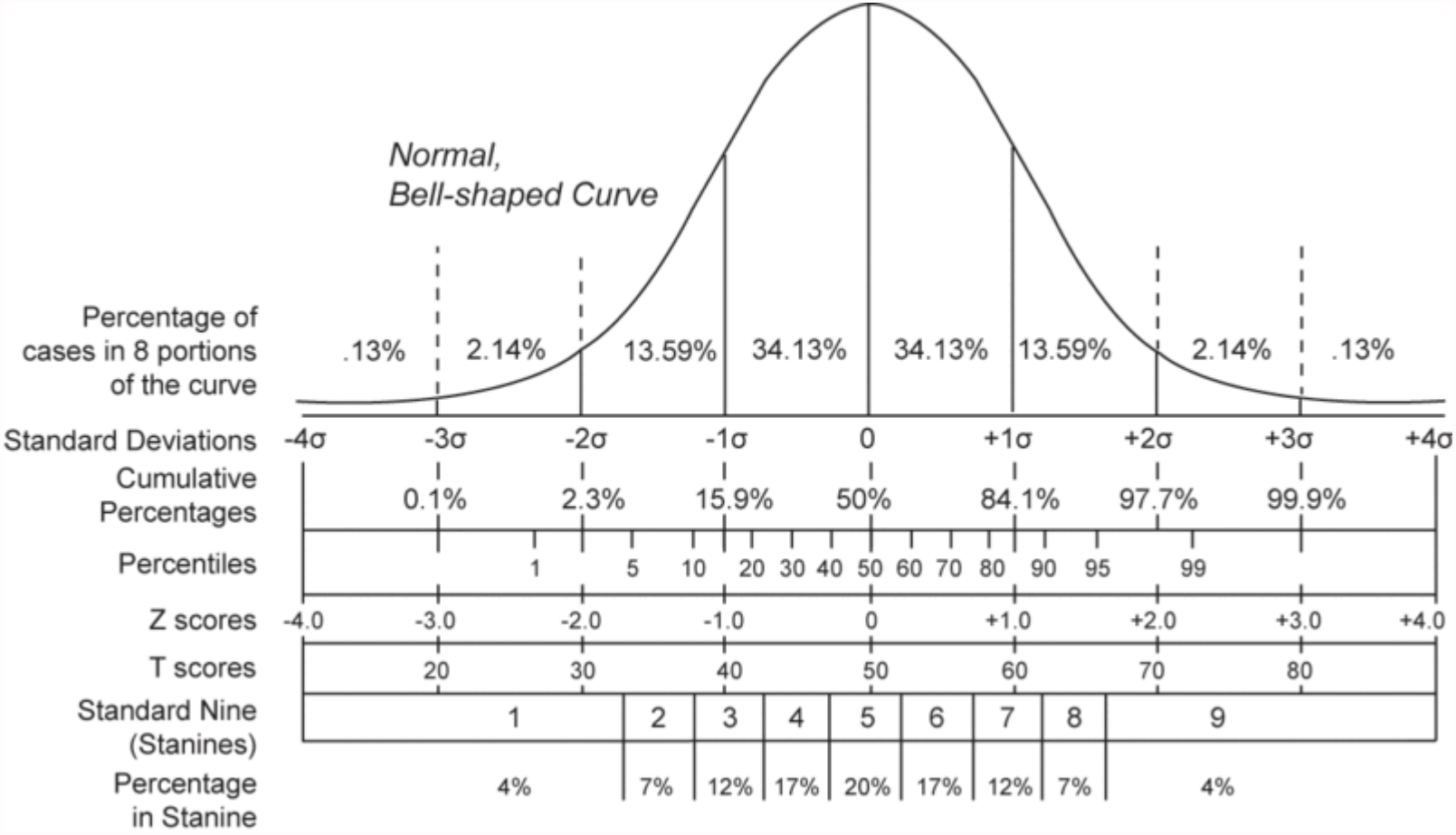


ANOMALY DETECTION WITH UNSUPERVISED ML

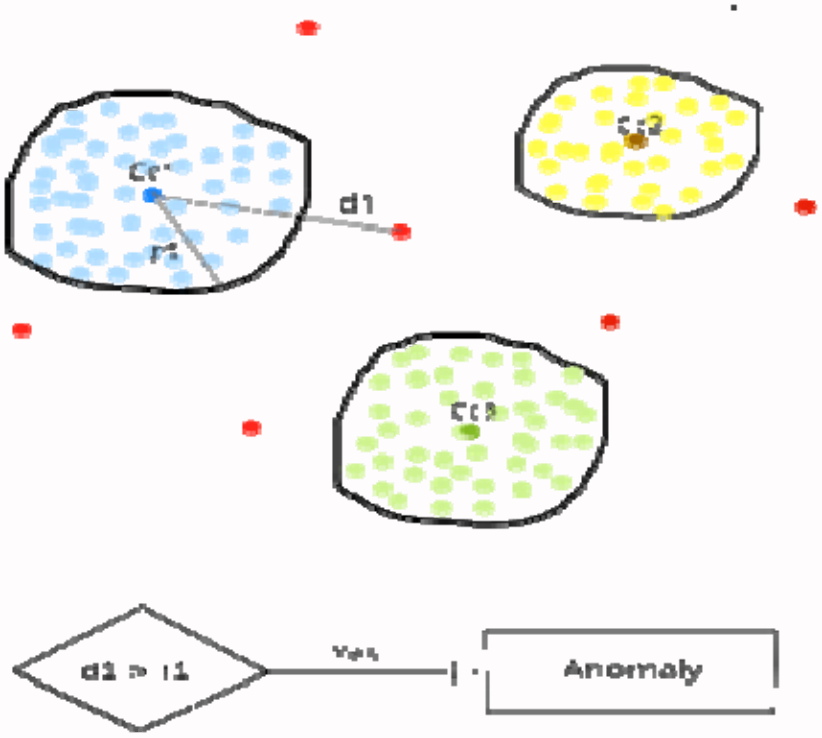
MODEL SELECTION

- Unsupervised
  - Gaussian Mixture
  - Streaming K-Means

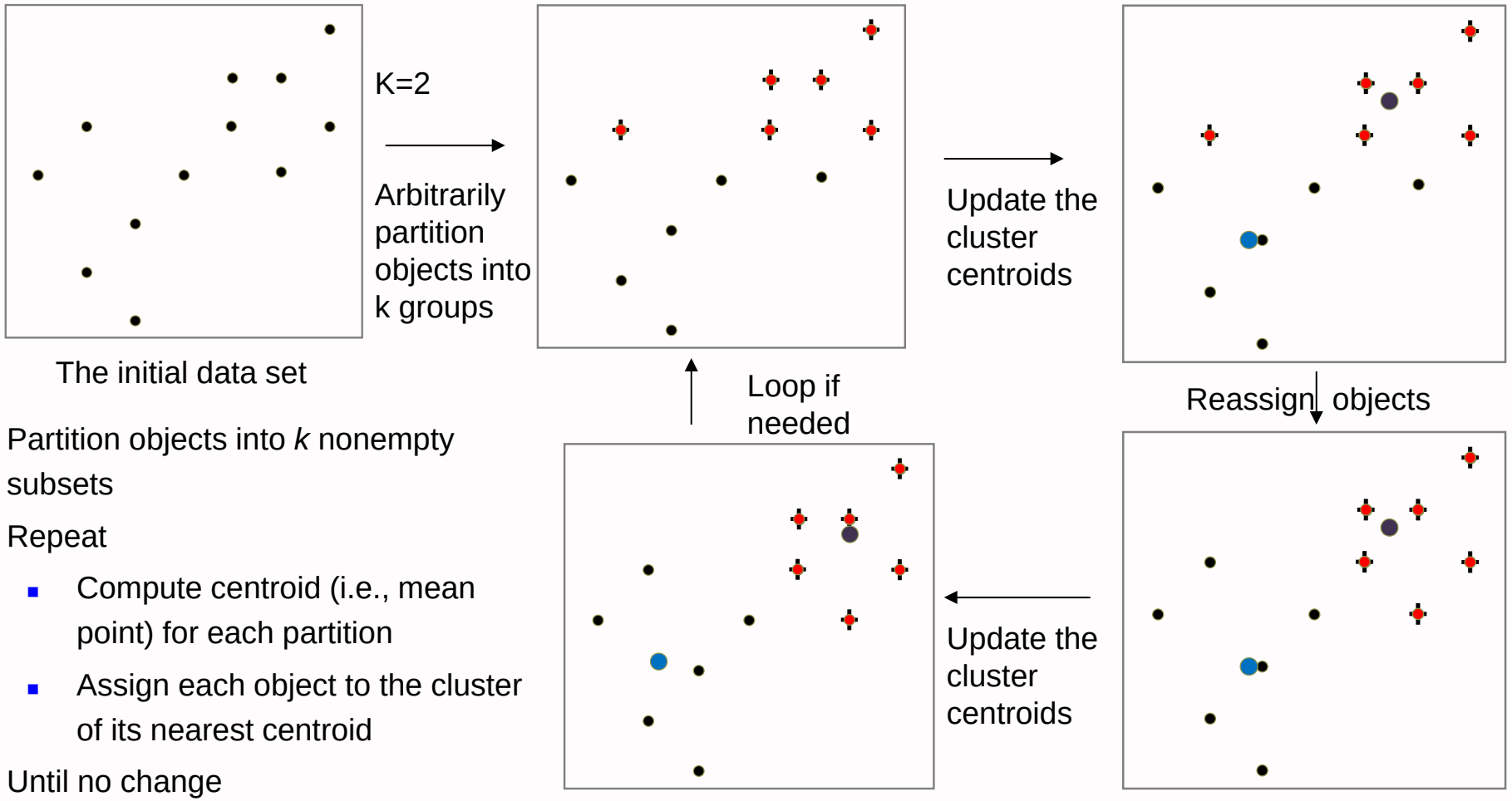
GAUSSIAN DISTRIBUTION



K-Means Clustering



Streaming K-Means – Adaptive Learning



- Partition objects into *k* nonempty subsets
- Repeat
  - Compute centroid (i.e., mean point) for each partition
  - Assign each object to the cluster of its nearest centroid
- Until no change

Algorithm (Streaming K-Means)

- Model Training (Normal dataset)
  - K: Number of clusters
  - Normalization of data
  - Engineering (categorical transformation/ dummy coding)
  - Labels/Entropy
- Trainer will yield centroid and threshold
- Validation
  - Anomalies: data points away from threshold from centroid

Algorithm (Streaming K-Means)

- ct : previous centre of cluster
- nt : number of points in a cluster
- xt : cluster centre for current data
- mt : number of points added in current batch
- Decay factor: ω

$$c_{t+1} = \frac{c_t n_t \omega + x_t}{n_t \omega + m_t} \qquad n_{t+1} = n_t + m_t$$

Happy Coding

Don’t Forget Machine Learning

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THANK YOU

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