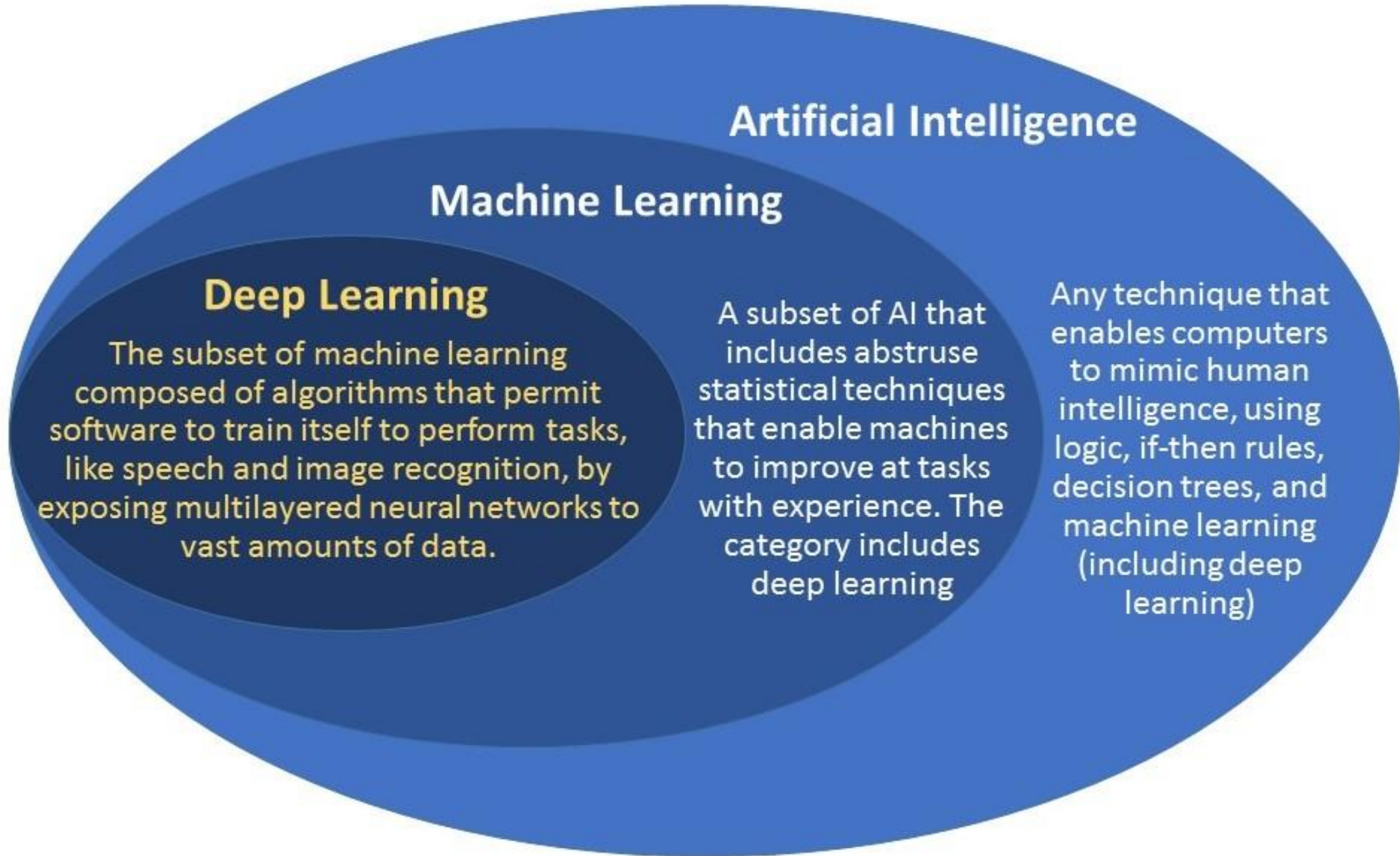




06/02/2020

5 pragmatic ways of using AI technology to improve your pricing

Unlocking Growth with Pricefx



SUPERVISED VS UNSUPERVISED MACHINE LEARNING

■ SUPERVISED

- INFERRING A FUNCTION FROM “LABELLED” TRAINING DATA
- TELL THE MACHINE “WHAT GOOD LOOKS LIKE”
- TRAINING THEN TESTING



■ UNSUPERVISED

- INFERRING A FUNCTION FROM “UNLABELLED” DATA
- NO TRAINING / TESTING MODEL
- NEURAL NETWORKS



SEGMENTATION TECHNIQUES

CLUSTERING

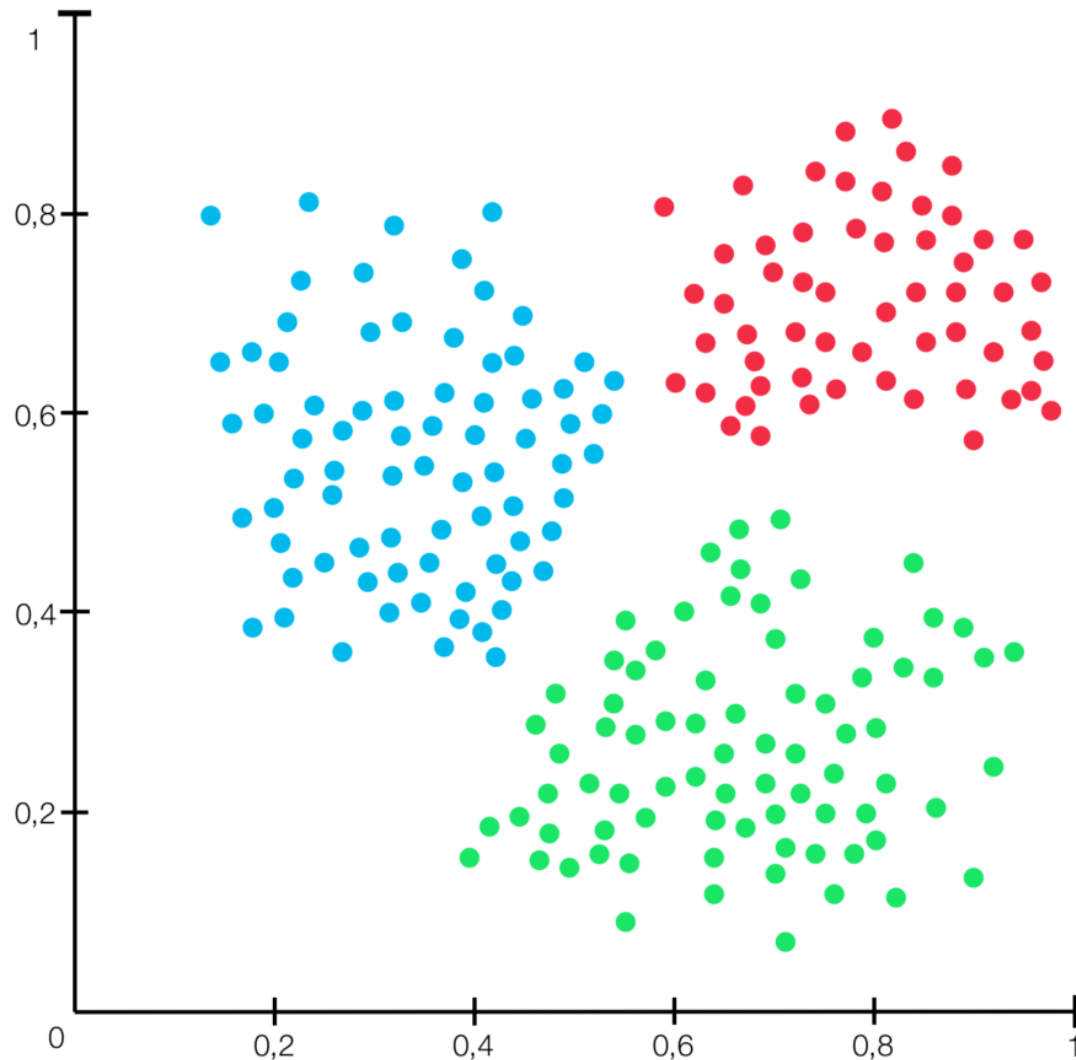
WHAT IT IS

- A DATA DRIVEN APPROACH FOR GROUPING LIKE PRODUCTS TOGETHER
- EXAMPLES: K-MEANS, X-MEANS
- NOT ALWAYS INTUITIVE TO EXPLAIN

WHERE IT FITS

- MORE SIMPLISTIC MODELS (E.G. ONLY PRODUCT)
- CONSUMER PRICING
- UNSUPERVISED MODELS

CLUSTERING EXAMPLE



- ANALYSE THE DATA TO COME UP WITH POTENTIAL AMOUNT OF SEGMENTS
- RUN K-MEANS, X-MEANS, DBSCAN...
- RERUN THE CLUSTERING TO VALIDATE
- USE CLUSTERS IN PRICING

SEGMENTATION TECHNIQUES

DECISION TREES

WHAT IT IS

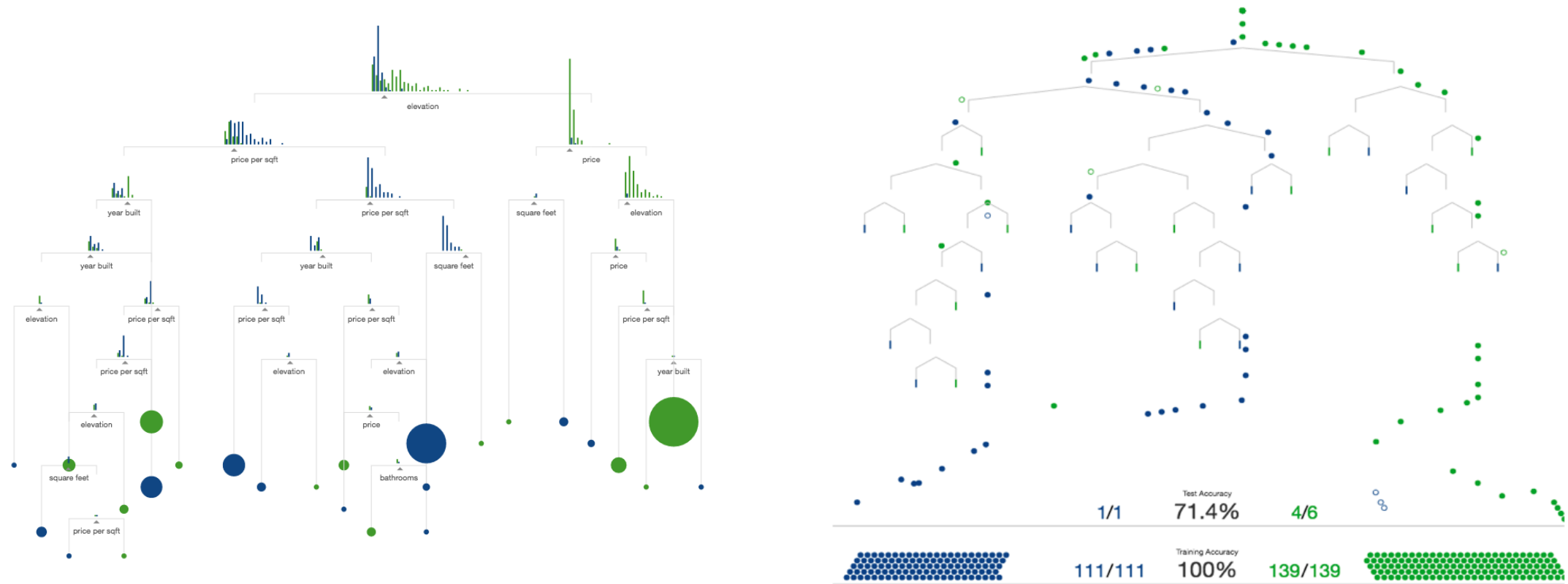
- A DATA DRIVEN APPROACH FOR GROUPING LIKE CUSTOMERS AND PRODUCTS TOGETHER
- VISUALIZED AS A TREE
- EASILY INTERPRETED AND OVER-RIDDEN

WHERE IT FITS

- MORE COMPLEX MODELS (E.G. PRODUCT+CUSTOMER+TXN)
- B2B PRICING
- SUPERVISED MODELS

ML EXAMPLE – SUPERVISED SEGMENTATION

Create a Model → Train the Model → Test the Model → Tune the Model



Foundational Principles

Segmentation 101: Why Segmentation?

- Faced with a new pricing event, it is natural to want to compare it with “similar” situations from the past to understand what the market will bear

New Deal to Price:

Product:	#16-S5C 5 cc Syringe, 100 pack
Product Cat 1:	Needles and Syringes
Product Cat 2:	Piston Syringes
Customer:	Apogee Physicians
Region:	Southwest
Customer Size:	Medium
Quantity:	20



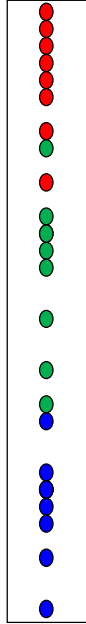
Should we look at history of...

- ▢ ... 5 cc Syringes?
- ▢ ... All Needles and Syringes?
- ▢ ... Southwest Region? Arizona?
- ▢ ... Medium-size customers? Physician Groups?
- ▢ ... High touch (“Service Drain”) customers?
- ▢ ... Just Apogee Physicians?
- ▢ etc.

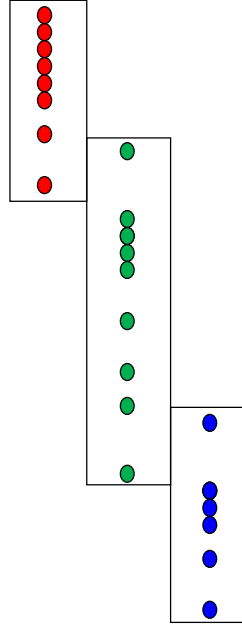
- Why even do segmentation – why not just find exact matches?
 - ▢ Not feasible: not enough transactions for every scenario
 - ▢ Want to “pool” data for similar customers/products to drive a more robust analysis – see what’s possible!
 - ▢ Want to drive common strategy for similar customers/products; differentiate different customers/products
- Challenge: need to determine what we mean by “similar” ☞ Segmentation
 - ▢ Group by how they look (attributes), or by how they behave (sales history)?
 - ▢ Approach: Both! Group by attributes, using behavior (e.g., margin) to determine what/how to group

Foundational Principles

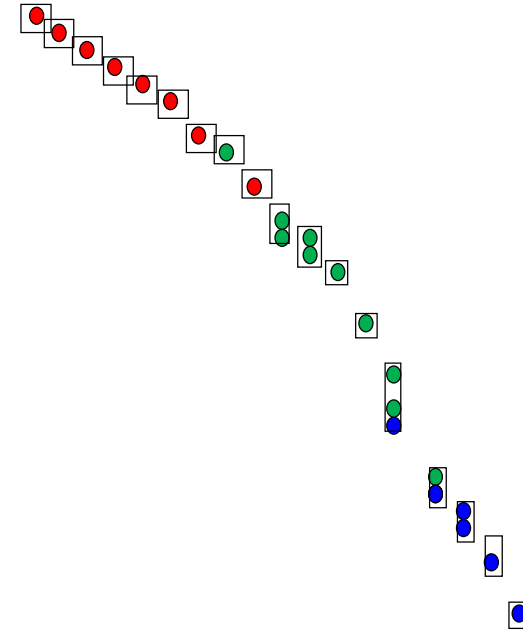
Segmentation Tradeoff: Granularity vs Data Sufficiency



Insufficient Granularity
Fails to capture key groupings



About Right



Too Granular

- False sense of precision
- Unmanageable number of segments

Foundational Principles

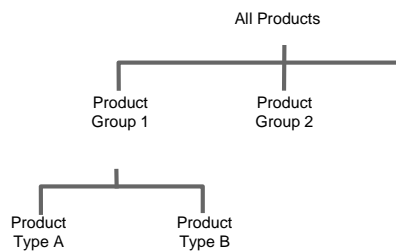
Segmentation Dimensions

What is being sold?



Product

- Product hierarchy:



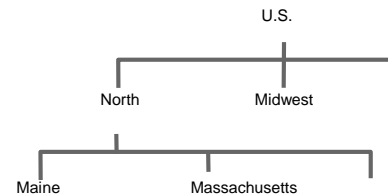
- Functional Attributes
- Physical Attributes
- Etc.

Who is buying it?



Customer

- Geography



- Customer Type
- Customer's annual revenue
- Avg margin, Frequency
- Etc.

How is it bought?

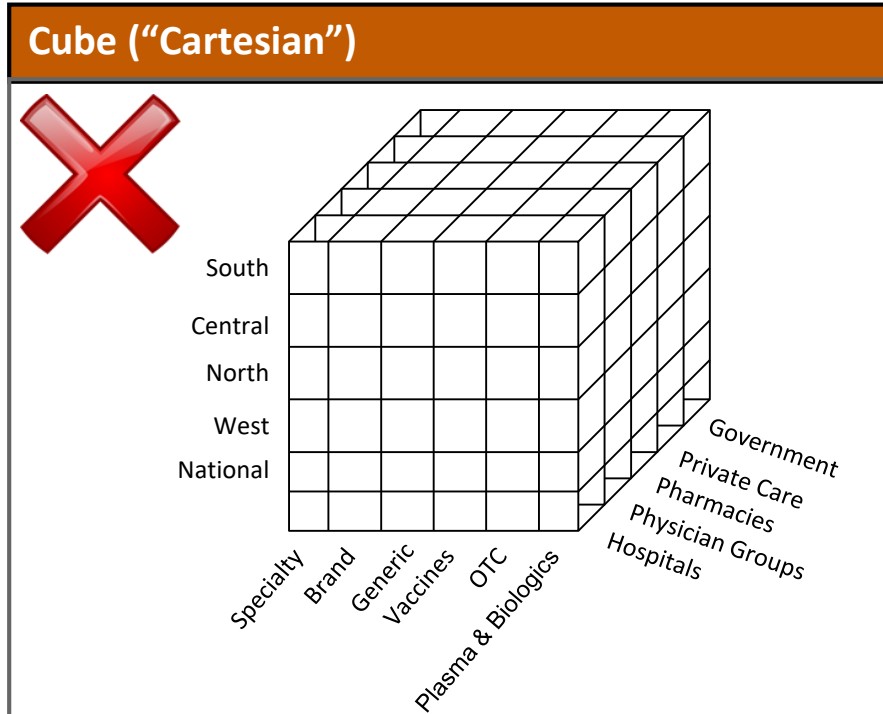


Transaction

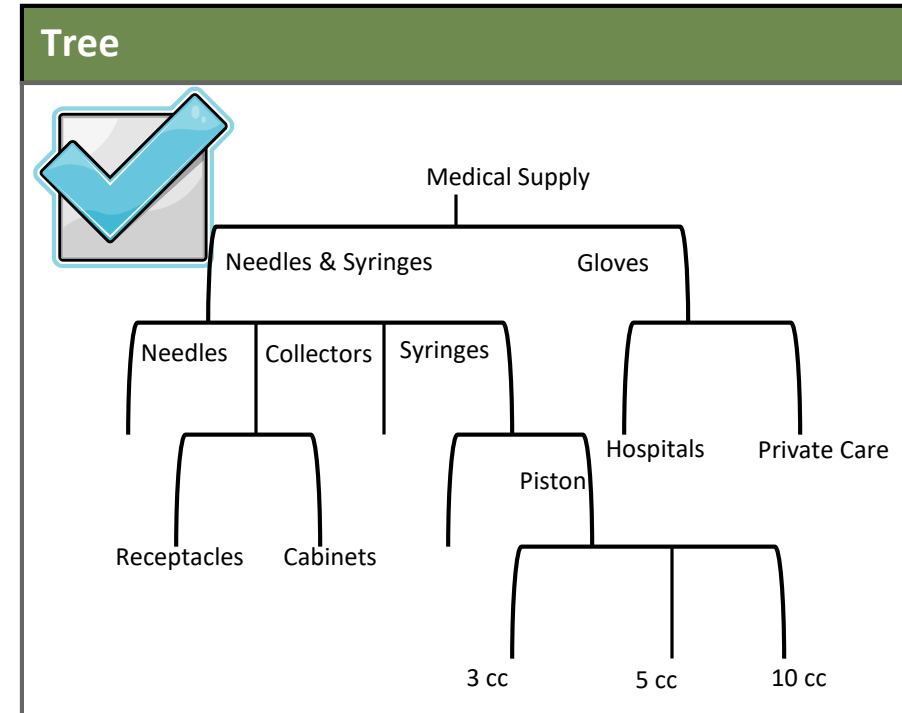
- Channel
- Spot buy vs. contract
- Order size
- Etc.

Foundational Principles

Segmentation Approach



- Only 3 dimensions used
- Huge number of segments
- Most segments empty

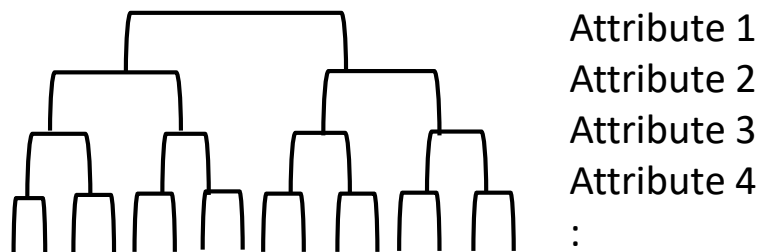
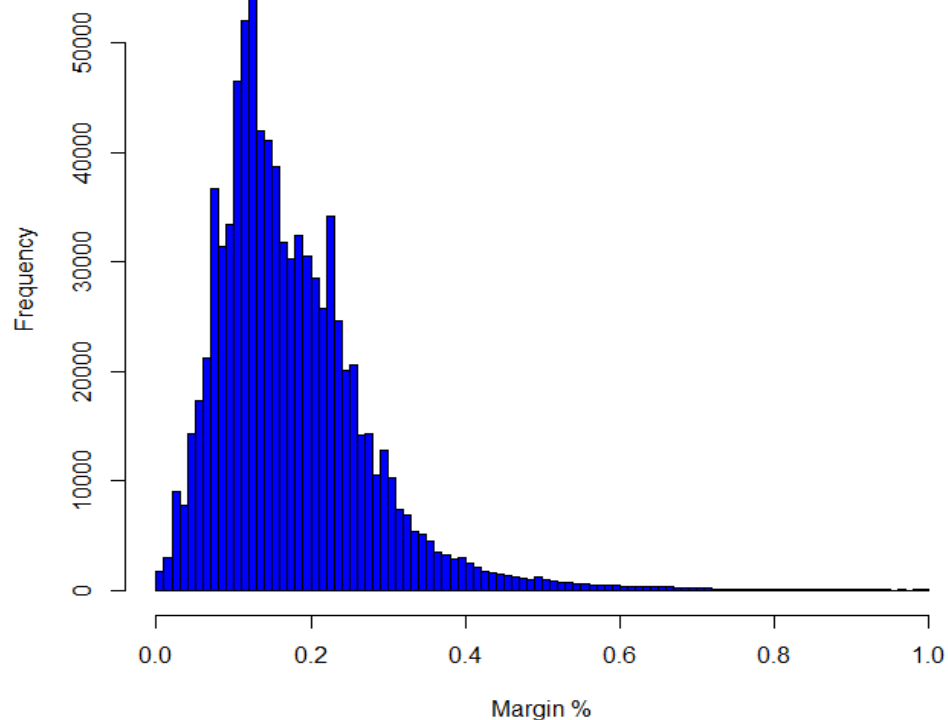


- All useful dimensions used
- Manageable number of segments
- All segments have enough data

Foundational Principles

Segmentation: Classification / Regression Tree

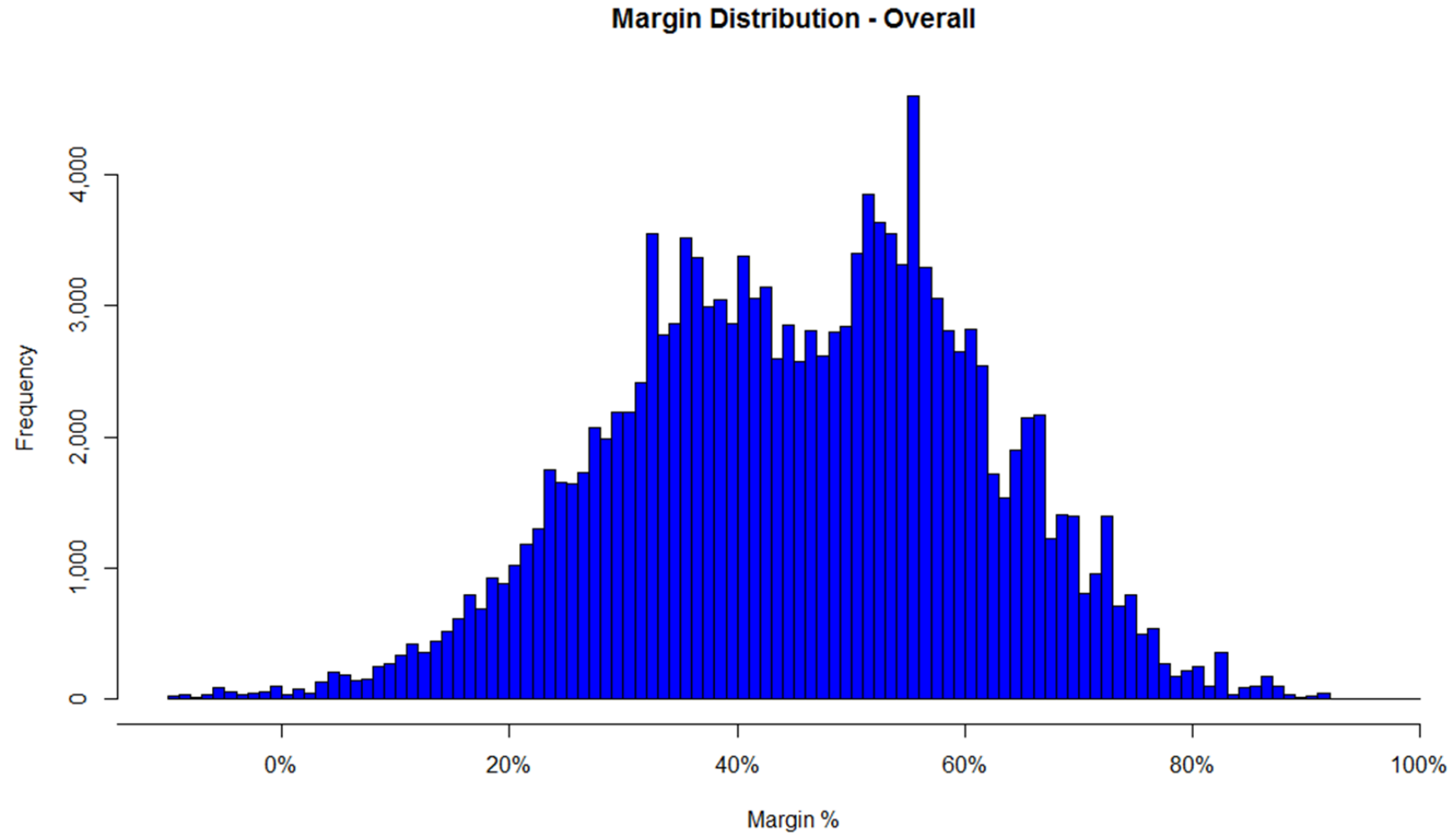
- Find sets of attributes that have similar behavior



- Start with complete set of sales history, and generate histogram
- Choose attribute, and split data across different values of the attribute
- Is there enough data to split? If so, continue, otherwise Stop
- Does resulting split cause differentiation? (I.e., same or different “shape”, mean, standard deviation, etc.?) If so, keep split, otherwise Stop
- Consider Type I and Type II errors
- Repeat for remaining attributes

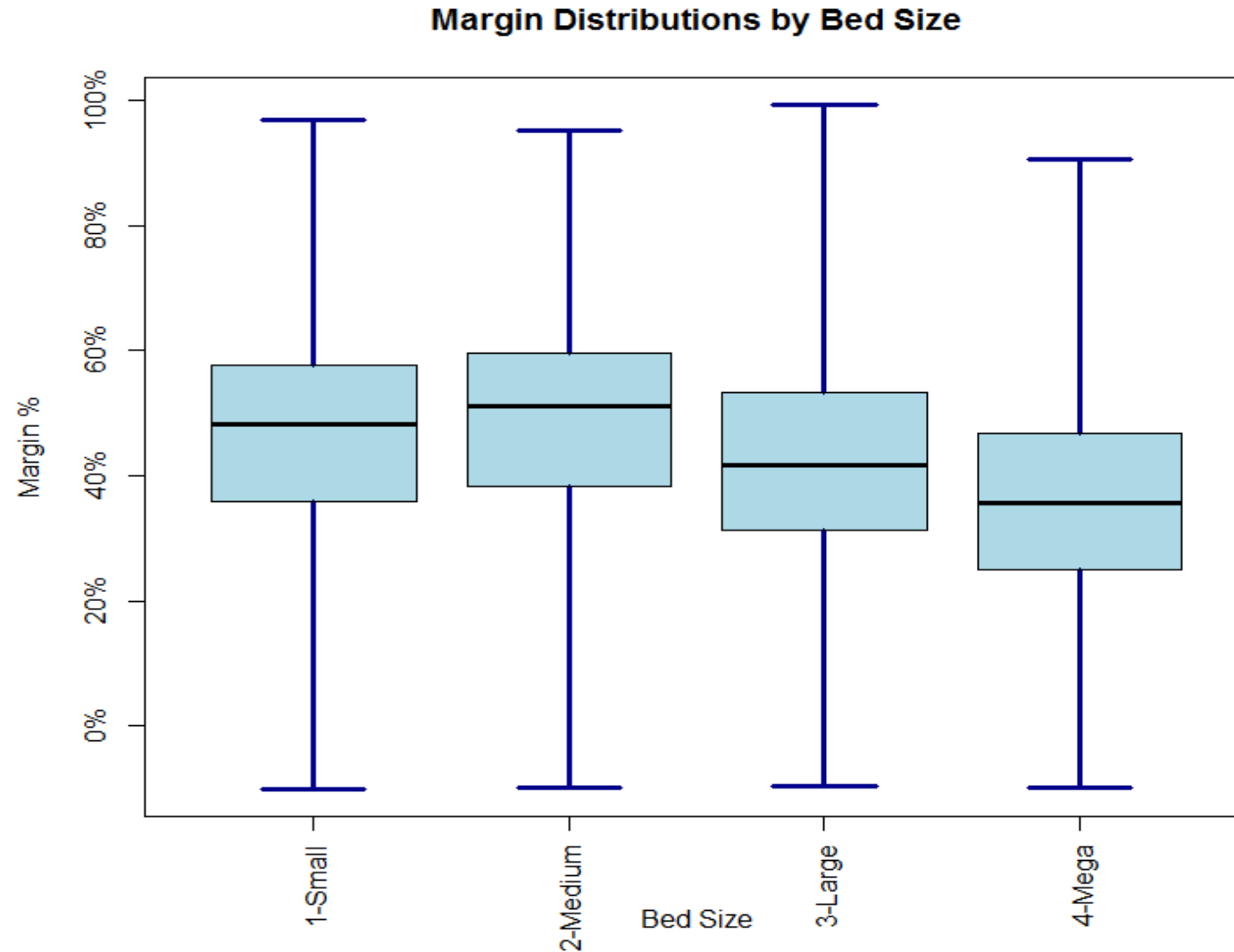
Foundational Principles

Illustrative Example



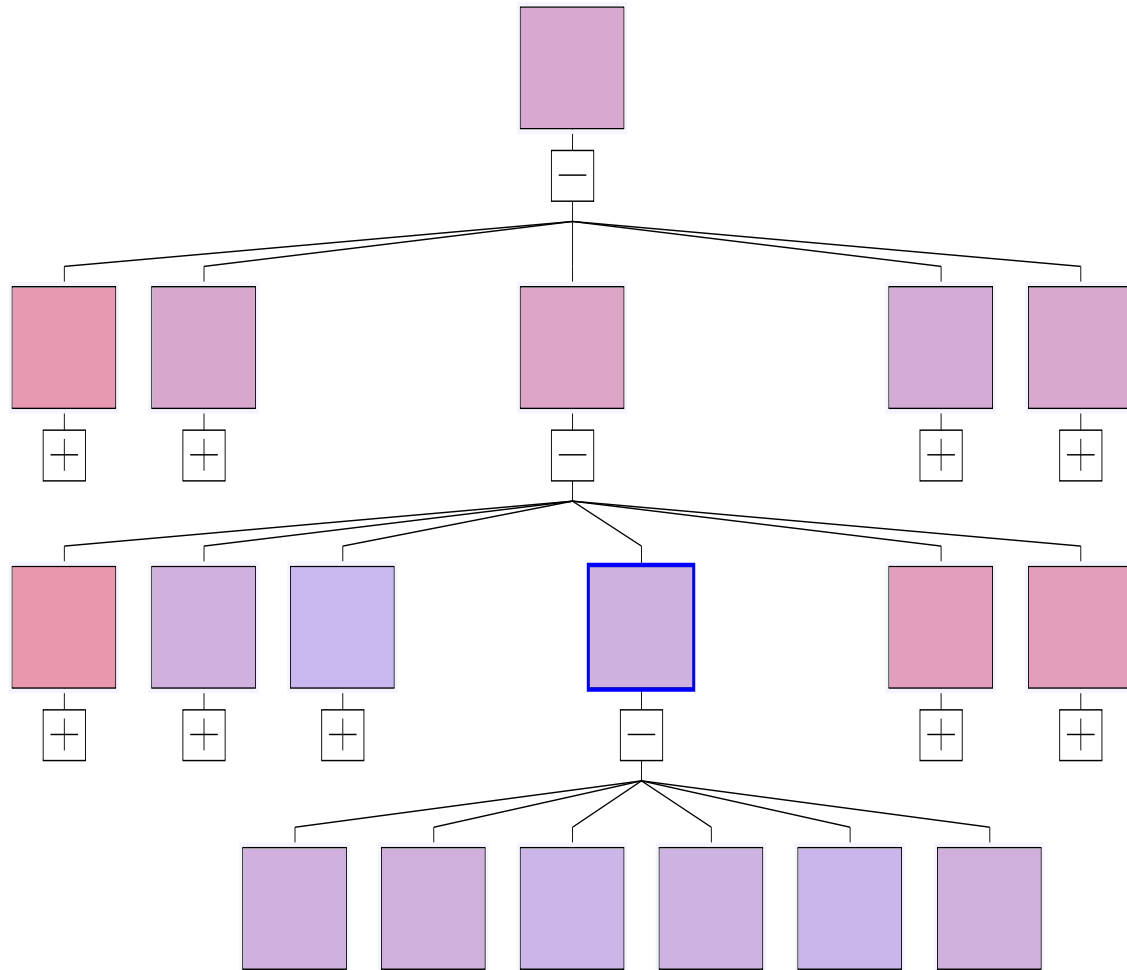
Foundational Principles

Illustrative Example

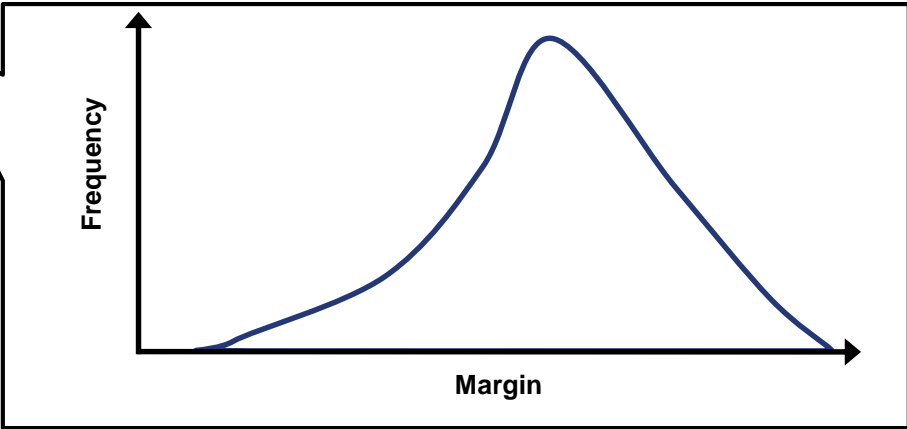


Foundational Principles

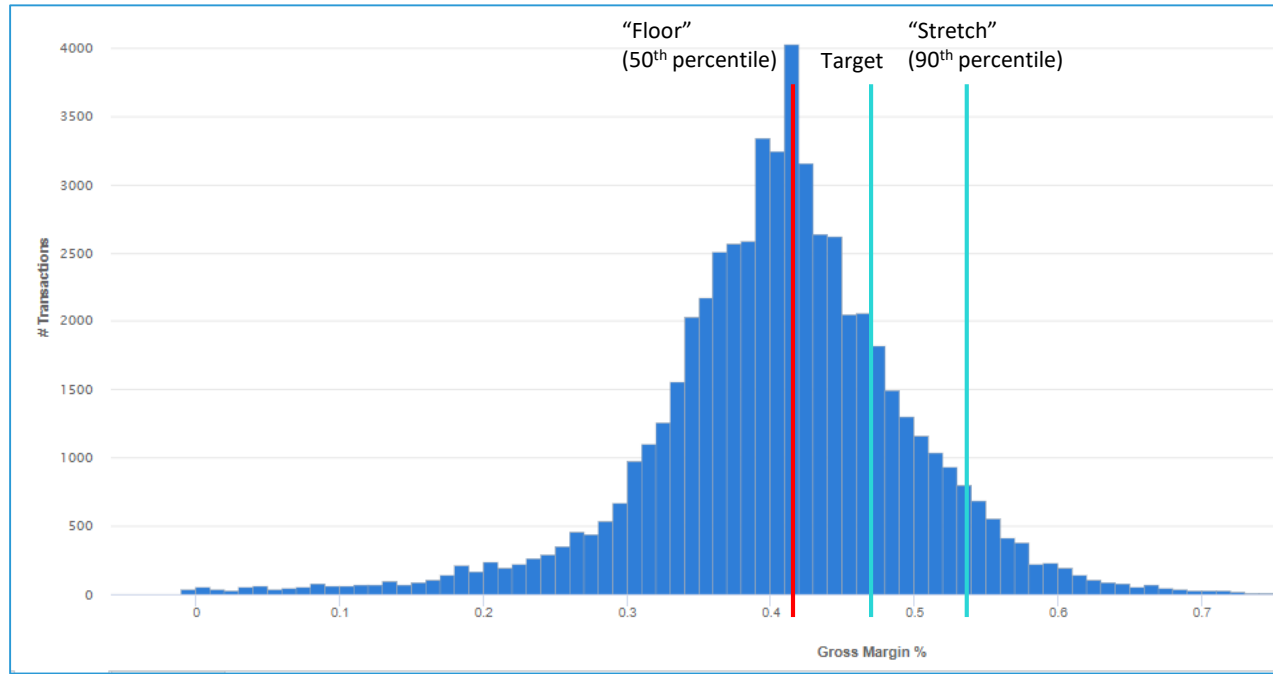
After Segmentation is complete... Now what?



- Result: Relevant price history for each segment
- Question: What can we do to impact the price going forward?



Pricing Guidance



- Set “Guardrails” (Floor and Stretch) that specify operating range, based on strategy
- Determine Target based on “pricing potential” of the segment
- “Pricing Potential” is measured by calculating a weighted “Score” for the segment from normalized metrics
- The Target Percentile is then calculated using: $\text{Target} = \text{Floor} + (\text{Score}/100) * (\text{Stretch} - \text{Floor})$
- The Score gives the proportional distance between Floor and Stretch for the Target

Out-of-the-Box Scoring Metric:

- The width of the distribution is an indicator of pricing potential; narrow distributions tend to have less potential, wider distributions tend to have more potential
- The Standard Deviation is a statistical measure of the absolute width of the distribution
- The Coefficient of Variation (CoV), which is the Standard Deviation / Mean, gives a relative measure of the width of the distribution
- We can then Normalize the CoV to yield a Score between 0 and 100:

$$\text{Score} = \min(0, \max(100, \text{CoV} * \text{scaling_factor} + \text{offset}))$$

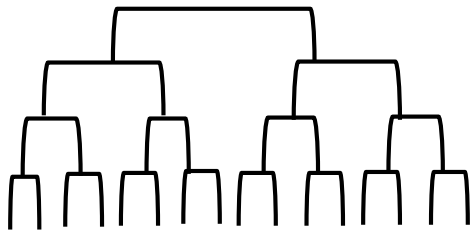
Additional Scoring Metrics:

- We can include other metrics in the overall score
- Other metrics might include: competitive intensity (lower CI = more potential), inventory levels (lower inventory = more potential), market saturation, etc
- For each metric, we normalize the metrics so that its values will range from 0 to 100
- We can then calculate the Overall Score by taking a weighted average of the individual scores:

$$\text{Score} = w1 * \text{Score}_1 + w2 * \text{Score}_2 + \dots + wn * \text{Score}_n$$

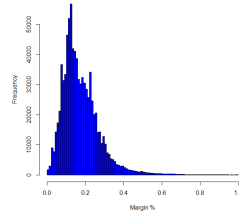
OVERALL CALCULATION FLOW

SEGMENTATION



Determine segments based on product/customer attributes and sales history

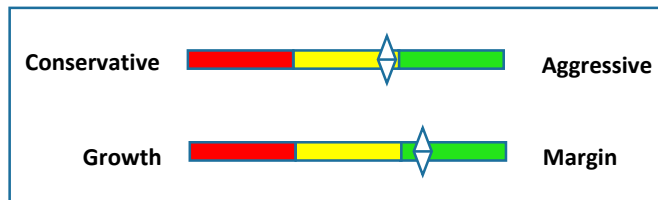
HISTORICAL PERFORMANCE



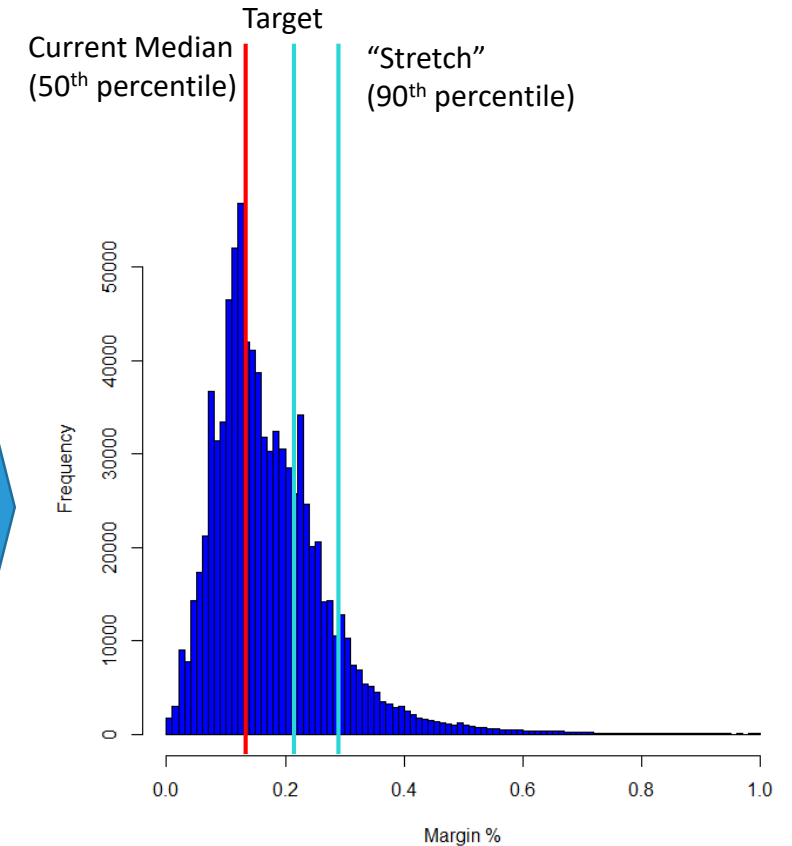
PRICING POTENTIAL SCOREBOARD

METRIC	RAW VALUE	NORMALIZED SCORE	WEIGHT
Competitive Intensity (1-5)	2	25	20%
Margin Variation (CoV)	58%	63	30%
Market Saturation Index	17.54	26	35%
Inventory Index	107.26	56	15%
Weighted Segment Score		41	

STRATEGY



PRICE SETTING



Determine target margin or discount based on historical performance, pricing potential score, and strategy for the segment

1.Customer Characteristics

- Demographics
- End use
- Products purchased

2.Behavioral

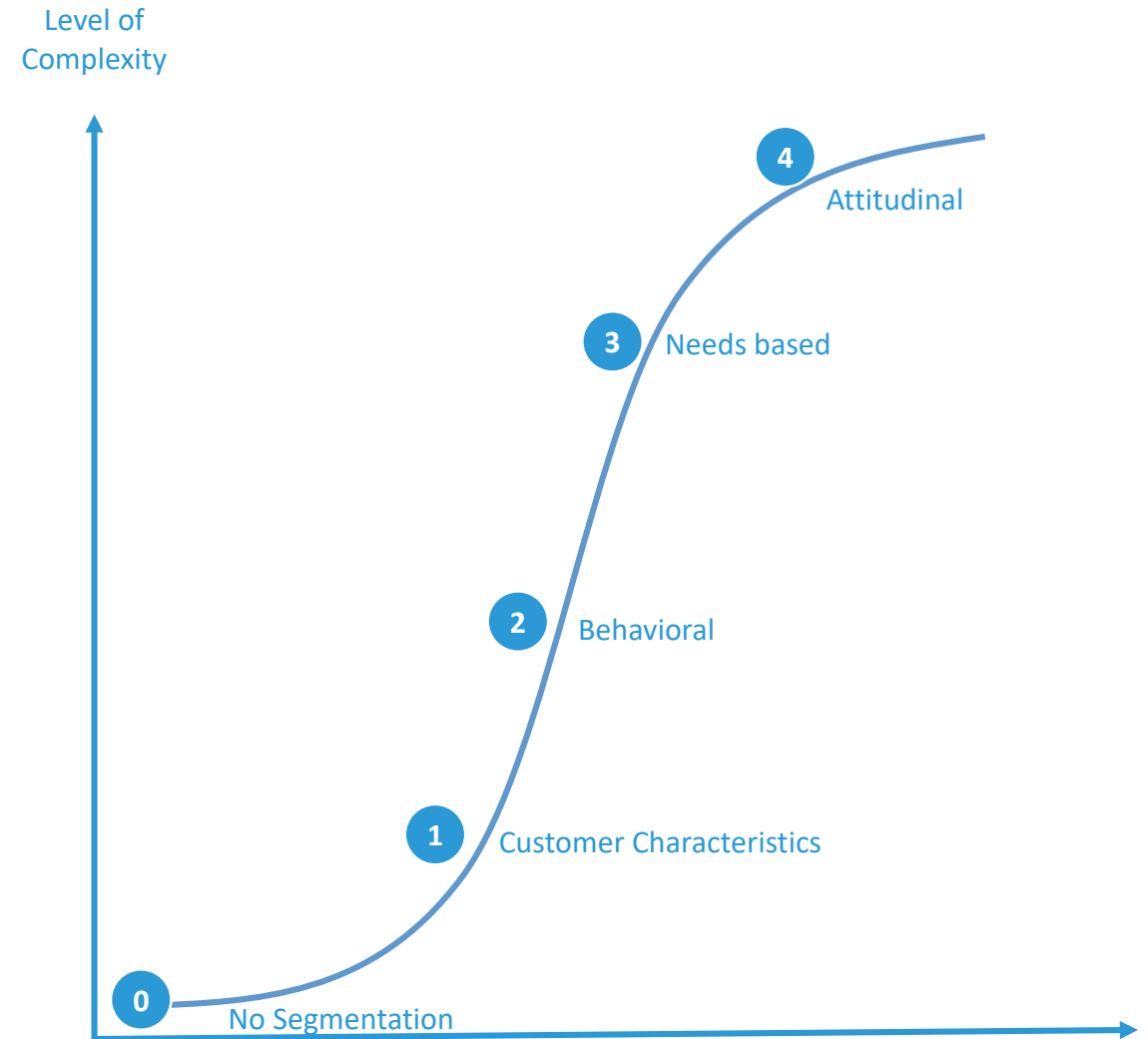
- Product Mix
- Purchase frequency
- Order pattern

3.Needs based

- Performance requirements
- Value in use expectations
- Service preferences

4.Attitudinal

- Brand loyalty
- Promotion sensitivity
- Sensitivity to switch



WHAT KIND OF RESULTS CAN I EXPECT?

TYPICAL RESULTS

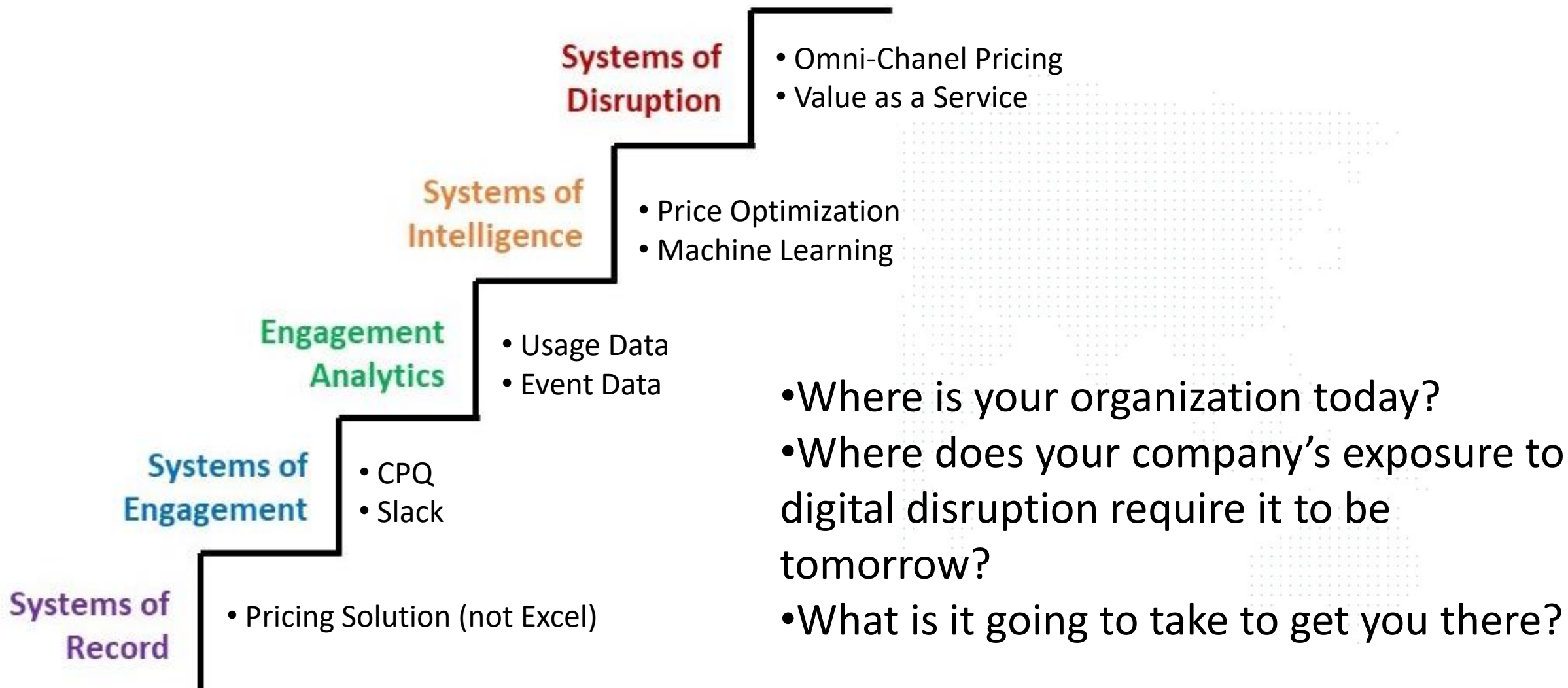
- .5 – 4% OF SALES IN PROFIT
- FASTER RESPONSE TIMES TO CHANGING MARKET CONDITIONS



FACTORS THAT INFLUENCE

- CURRENT LEVEL OF SOPHISTICATION
- DATA AVAILABLE
 - QUALITY
 - QUANTITY
- VARIATION OF PRICING
- CURRENT LEVEL OF PROFITABILITY
- COMPETITIVE ENVIRONMENT
- COMMODIZATION OF PRODUCTS

GEOFFREY MOORE: DIGITAL SYSTEMS MATURITY MODEL



WILL FUTURE PRICING PROFESSIONALS NEED TO BE DATA SCIENTISTS?

MODERN DATA SCIENTIST

Data Scientist, the sexiest job of the 21st century, requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

MATH & STATISTICS

- ☆ Machine learning
- ☆ Statistical modeling
- ☆ Experiment design
- ☆ Bayesian inference
- ☆ Supervised learning: decision trees, random forests, logistic regression
- ☆ Unsupervised learning: clustering, dimensionality reduction
- ☆ Optimization: gradient descent and variants

DOMAIN KNOWLEDGE & SOFT SKILLS

- ☆ Passionate about the business
- ☆ Curious about data
- ☆ Influence without authority
- ☆ Hacker mindset
- ☆ Problem solver
- ☆ Strategic, proactive, creative, innovative and collaborative

PROGRAMMING & DATABASE

- ☆ Computer science fundamentals
- ☆ Scripting language e.g. Python
- ☆ Statistical computing packages, e.g., R
- ☆ Databases: SQL and NoSQL
- ☆ Relational algebra
- ☆ Parallel databases and parallel query processing
- ☆ MapReduce concepts
- ☆ Hadoop and Hive/Pig
- ☆ Custom reducers
- ☆ Experience with xaaS like AWS

COMMUNICATION & VISUALIZATION

- ☆ Able to engage with senior management
- ☆ Story telling skills
- ☆ Translate data-driven insights into decisions and actions
- ☆ Visual art design
- ☆ R packages like ggplot or lattice
- ☆ Knowledge of any of visualization tools e.g. Flare, D3.js, Tableau





Thank you!

If you have any questions feel free to ask!

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