

Unit 4

Content



Customer segmentation and profiling using clustering techniques



Market basket analysis and recommendation systems



Time series forecasting and demand prediction



Text analytics and sentiment analysis for customer feedback and social media data

Customer segmentation and profiling



Customer segmentation is a process that divides a broad customer base into smaller, more homogeneous groups or segments.



Clustering techniques are often used to achieve effective segmentation and profiling

to create more targeted marketing strategies
personalize customer experiences
optimize product offerings

Customer segmentation

- the goal is to let the numbers and statistics help us be more *objective and statistically correct*.
- The “Business Decision”
 - The management team of a large shopping mall would like to understand the types of people who are, or could be, visiting their mall.
 - They have good reasons to believe that there are a few different market segments
 - services better in order to attract mainly a few profitable market segments, or to differentiate their services (e.g. invitations to events, discounts, etc) across market segments.
- The Data
 - the management team run a market research survey of a few potential customers.
 - In this case this was a small survey to only a few people, where each person answered six attitudinal questions and a question regarding how often they visit the mall,
 - all on a scale 1-7, as well as one question regarding their household income:

Table 1: Survey Question Descriptions and Scales



Name	Description	Scale
V1	Shopping is fun	1-7
V2	Shopping is bad for your budget	1-7
V3	I combine shopping with eating out	1-7
V4	I try to get the best buys while shopping	1-7
V5	I don't care about shopping	1-7
V6	You can save a lot of money by comparing prices	1-7
Income	The household income of the respondent	Dollars
Mall.Visits	How often they visit the mall	1-7

Table 2: Responses of the First 10 People



ID	V1	V2	V3	V4	V5	V6	Income	Mall.Visits
1	6	4	7	3	2	3	60000	3
2	2	3	1	4	5	4	30000	1
3	7	2	6	4	1	3	70000	3
4	4	6	4	5	3	6	30000	7
5	1	3	2	2	6	4	60000	1
6	6	4	6	3	3	4	50000	2
7	5	3	6	3	3	4	65000	3
8	7	3	7	4	1	4	55000	4
9	2	4	3	3	6	3	70000	0
10	3	5	3	6	4	6	25000	6

How to Conduct Customer Segmentation and Profiling:

Data Collection:

Gather comprehensive data on your customers, including demographics, purchase history, online behavior, and preferences.

Data Analysis:

Use statistical analysis to categorize customers into segments based on shared characteristics. Common segmentation includes demographic, psychographic, behavioral, and geographical segmentation.

Profile Development:

Develop profiles for each segment, which includes common needs, preferred communication channels, and potential barriers to purchase.

Tailored Strategies:

Create targeted marketing campaigns and product development strategies for each segment to address their specific needs and preferences.

Monitoring and Adapting:

Continuously monitor the performance of each segment and adapt your strategies as customer behaviors and market conditions change.

Examples of Customer Segmentation and Profiling:



Demographic Segmentation:

- Dividing the market into groups based on variables such as age, gender, income, occupation, and family status.

Behavioural Segmentation:

- Grouping by purchase history, loyalty to the brand, user status, or usage rate.

Psychographic Segmentation:

- Segmenting according to lifestyle, personality traits, values, opinions, and interests of consumers.

Geographical Segmentation:

- Categorizing customers by geographic boundaries such as nations, states, regions, cities, or neighbourhoods.

Targeting the right customer

Customer profiles often follow a specific template. Here are some examples.

CUSTOMER PROFILE 1

Suburban online shopper

A major retailer wants to expand its online presence.

DEMOGRAPHICS

- Early 40s
- Two children in school
- Suburban
- Income \$55,000
- College degree

INTERESTS/ATTITUDES

- Family-focused
- Active
- Community-oriented
- Often spontaneous

BEHAVIORAL

- Heavy social media user
- Browses before buying
- Seeks out special promo

PREFERRED CONTENT

- Healthy lifestyle
- Family values
- Recreational



CUSTOMER PROFILE 2

Spouse-to-be

A wedding planners' consortium wants to expand market for all its members via online marketing.

DEMOGRAPHICS

- Late 20s
- Never been married, no children
- Not a homeowner
- Income \$40,000
- College degree

INTERESTS/ATTITUDES

- Active
- Well-traveled
- Music lover

BEHAVIORAL

- Heavy social media user
- Does research before buying
- Not a casual browser

PREFERRED CONTENT

- Travel
- Recreational
- Health and fitness



CUSTOMER PROFILE 3

College student

A clothing manufacturer wants to increase online market share among 18-to-22-year-olds, targeting college students.

DEMOGRAPHICS

- 19
- College student
- Unmarried
- Income <\$14,000
- Part-time employment

INTERESTS/ATTITUDES

- Active
- Pressed for time
- Music lover, moviegoer
- Spontaneous
- Experiences stress

BEHAVIORAL

- Heavy social media user
- Heavy cell phone user
- Not very brand-conscious
- Does little research before buying

PREFERRED CONTENT

- Recreational
- Pop culture
- Humor



TIME SERIES ANALYSIS AND FORECASTING

Introduction to Time Series Analysis

- A *time-series* is a set of observations on a quantitative variable collected over time.
- Examples
 - Dow Jones Industrial Averages
 - Historical data on sales, inventory, customer counts, interest rates, costs, etc
- Businesses are often very interested in forecasting time series variables.
- Often, independent variables are not available to build a regression model of a time series variable.
- In time series analysis, we analyze the past behavior of a variable in order to predict its future behavior.

Methods used in Forecasting

- Regression Analysis
- Time Series Analysis (TSA)
 - A statistical technique that uses time-series data for explaining the past or forecasting future events.
 - The prediction is a function of time (days, months, years, etc.)
 - No *causal* variable; examine past behavior of a variable and attempt to predict future behavior

Components of TSA



Time Frame (How far can we predict?)

- short-term (1 - 2 periods)
- medium-term (5 - 10 periods)
- long-term (12+ periods)
- No line of demarcation

Trend

- Gradual, long-term movement (up or down) of demand.
- Easiest to detect

Components of TSA (Cont.)



Cycle

- An up-and-down repetitive movement in demand.
- repeats itself over a long period of time

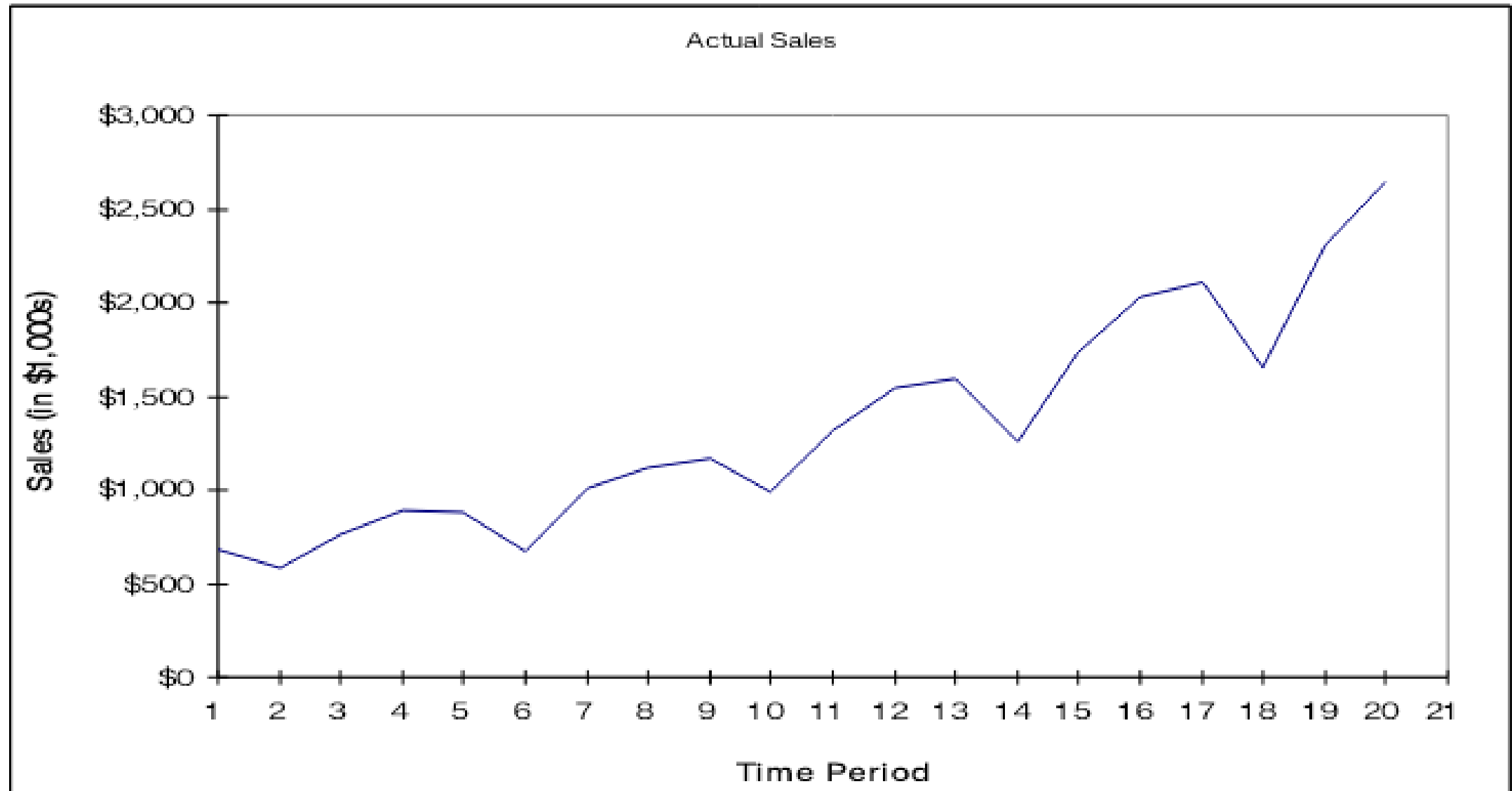
Seasonal Variation

- An up-and-down repetitive movement within a trend occurring periodically.
- Often weather related but could be daily or weekly occurrence

Random Variations

- Erratic movements that are not predictable because they do not follow a pattern

Time Series Plot



Components of TSA (Cont.)

- Difficult to forecast demand because...
 - There are no causal variables
 - The components (trend, seasonality, cycles, and random variation) cannot always be easily or accurately identified

Some Time Series Terms



Stationary Data - a time series variable exhibiting no significant upward or downward trend over time.



Nonstationary Data - a time series variable exhibiting a significant upward or downward trend over time.



Seasonal Data - a time series variable exhibiting a repeating patterns at regular intervals over time.

Approaching Time Series Analysis

There are many, many different time series techniques.

It is usually impossible to know which technique will be best for a particular data set.

It is customary to try out several different techniques and select the one that seems to work best.

To be an effective time series modeler, you need to keep several time series techniques in your “tool box.”

Moving Averages



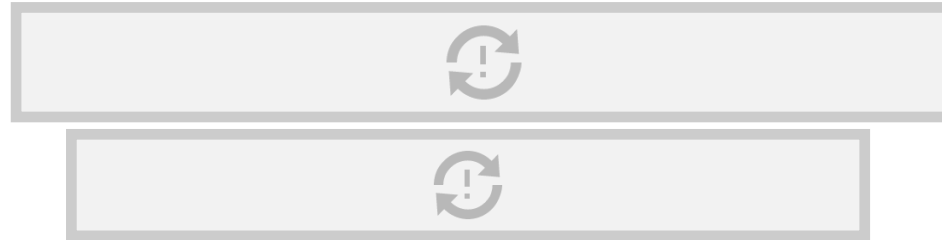
- No general method exists for determining k .
- We must try out several k values to see what works best.

Weighted Moving Average

- The moving average technique assigns equal weight to all previous observations



- The weighted moving average technique allows for different weights to be assigned to previous observations.



- We must determine values for k and the w_i

Trend Models

- Trend is the long-term sweep or general direction of movement in a time series.
- We'll now consider some nonstationary time series techniques that are appropriate for data exhibiting upward or downward trends.

The Linear Trend Model



For example:



The TREND() Function

TREND(Y-range, X-range, X-value for prediction)

where:

Y-range is the spreadsheet range containing the dependent Y variable,

X-range is the spreadsheet range containing the independent X variable(s),

X-value for prediction is a cell (or cells) containing the values for the independent X variable(s) for which we want an estimated value of Y.

Note: The TREND() function is dynamically updated whenever any inputs to the function change. However, it does not provide the statistical information provided by the regression tool. It is best to use these two different approaches to doing regression in conjunction with one another.

Combining Forecasts

- It is also possible to combine forecasts to create a composite forecast.
- Suppose we used three different forecasting methods on a given data set.
- Denote the predicted value of time period t using each method as follows:



- We could create a composite forecast as follows:



