Social Analytics and Social Network Analysis

1. Social Analytics

- **Definition**: The meaning of social analytics varies based on perspective.
    1. *Philosophical View*: Introduced by Lars-Henrik Schmidt, focusing on "socius" (commonness).
    2. *Practical View*: Analyzing digital interactions, relationships, and textual content from social media.
- **Purpose**:
    1. Understand customer behavior, preferences, and trends.
    2. Analyze text data (sentiment analysis, NLP) and social networks (influencer identification, profiling).
- **Branches of Social Analytics**:
    1. **Social Network Analysis (SNA)** – Studies relationships and structures in social networks.
    2. **Social Media Analytics** – Focuses on analyzing data from social media platforms.

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2. Social Network Analysis (SNA)

- **Definition**:
    1. Examines social structures made up of individuals, groups, or organizations.
    2. Uses mathematical models, statistics, and graph theory.
    3. Originated in the 1950s, developed further in the 1980s.
- **Applications**:
    1. Identifying influential individuals or entities.
    2. Understanding network dynamics and communication patterns.
    3. Used in business intelligence, consumer analytics, and sociology.
- **Types of Social Networks Relevant to Business**:
    1. **Communication Networks** – Analyze information flow between individuals/groups.
    2. **Community Networks** – Study online and offline community interactions.
    3. **Criminal Networks** – Understand criminal activities through network patterns.
    4. **Innovation Networks** – Examine how ideas and innovations spread in a network.

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3. Social Network Analysis Metrics

- **Concept**:
    - Networks consist of **nodes** (individuals/organizations) and **ties** (relationships).
    - Represented using social network diagrams (nodes = points, ties = lines).
- **Categories of SNA Metrics**:
    - **Connections** – Measures relationships and linkages.
    - **Distributions** – Examines how connections are spread.
    - **Segmentation** – Identifies clusters and influential entities.
- **Usage**:
    - Helps businesses optimize communication and marketing strategies.
    - Supports law enforcement in tracking criminal networks.
    - Enhances innovation adoption through understanding network influence.

Conclusion

Social analytics helps in monitoring and interpreting digital interactions, while social network analysis provides a structured way to study relationships and influence. These analyses are widely used in business, sociology, criminology, and innovation tracking.

SOCIAL MEDIA DEFINITIONS AND CONCEPTS

Definition of Social Media

- Social media consists of technologies that enable social interactions where people create, share, and exchange information, ideas, and opinions.
- It is based on Web 2.0, allowing the creation and exchange of user-generated content (Kaplan & Haenlein, 2010).
- Social media relies on mobile and web-based platforms to facilitate interactive communication.

Evolution of Social Media

- Emerged in the early 1990s and has significantly improved in quality and quantity.
- Covers multiple formats, including blogs, forums, wikis, social networks, podcasts, videos, and ratings.
- Kaplan & Haenlein (2010) classified social media into six categories:
    1. **Collaborative projects** (e.g., Wikipedia)
    2. **Blogs and microblogs** (e.g., Twitter)
    3. **Content communities** (e.g., YouTube)
    4. **Social networking sites** (e.g., Facebook)
    5. **Virtual game worlds** (e.g., World of Warcraft)
    6. **Virtual social worlds** (e.g., Second Life)

Differences Between Social and Industrial Media

- **Quality:** Industrial media content is typically refined before publication, whereas social media content varies widely in quality.
- **Reach:** Both can reach a global audience, but social media is decentralized.
- **Frequency:** Social media content is updated and reposted more frequently.
- **Accessibility:** Industrial media is costly and owned by corporations, while social media is generally free or low-cost.
- **Usability:** Industrial media requires specialized skills; social media can be used by anyone.
- **Immediacy:** Social media allows for real-time responses, unlike industrial media, which has longer publishing cycles.
- **Updatability:** Social media content can be altered instantly, while industrial media is static once published.

Social Media Usage Trends

- Increasing engagement levels in social networking sites.
- Brogan & Bastone (2011) identified six levels of social media engagement.

- The number of inactive users has significantly decreased, with 82% of the online population now actively engaging with social media.
- Social media has reached mass adoption.

Social Media Analytics

Definition & Importance

- **Social media analytics** systematically processes content from social media platforms to improve an organization's competitiveness.
- Helps organizations understand and engage with consumers more effectively.
- Used for **integrated marketing and communication strategies**.

Growth & Adoption

- Growth of social media platforms: Facebook, Twitter, LinkedIn, YouTube, etc.
- Analytics tools help businesses engage with millions of customers daily.
- **Harvard Business Review (2010) Survey Findings:**
  - 75% of companies don't know where their valuable customers are talking about them.
  - 31% do not measure the effectiveness of social media.
  - Only 23% use social media analytic tools.
  - Just 7% integrate social media into marketing activities.

Challenges & Potential

- Many companies still use social media mainly for **one-way promotion** instead of listening and analyzing customer conversations.
- Despite challenges, companies expect **growth in social media investment** even as spending on traditional media declines.

Measuring Social Media Impact

- Extracting insights from billions of posts, reviews, and blogs is challenging.
- Analytics tools fall into three categories:
  1. **Descriptive Analytics** – Tracks statistics like followers, engagement, and platform usage.
  2. **Social Network Analysis** – Maps influence and connection networks.
  3. **Advanced Analytics** – Uses **predictive and text analytics** to analyze themes, sentiment, and trends.

Best Practices in Social Media Analytics (Paine & Chaves, 2012)

1. **Think of Measurement as a Guidance System**
   - Analytics should **identify effective strategies** rather than just reward or punish performance.
   - Helps determine **which platforms matter most** to your audience.
2. **Track Sentiment Accurately**

- Extract and categorize sentiment from online conversations as **positive, negative, or neutral**.
      - Avoid tagging mixed-polarity phrases (e.g., "great location but smelly bathroom") as neutral.
3. **Continuously Improve Text Analysis Accuracy**
      - Use industry-specific **text analytics tools** that adapt and refine their accuracy over time.
4. **Monitor the Ripple Effect**
      - A single social media mention may **spread through retweets, shares, and influencer posts**.
      - Identify which posts go **viral** and why.
5. **Look Beyond the Brand**
      - Track **broader industry conversations**, not just direct mentions of your brand.
6. **Identify Key Influencers**
      - Focus on influencers who **shape conversations in your industry**, not just brand advocates.
7. **Evaluate the Accuracy of Analytics Tools**
      - Accuracy varies across platforms (80–90% for review sites/Twitter, 60–70% for blogs/forums).
8. **Incorporate Social Media Insights into Business Planning**
      - Identify **patterns between social media metrics and business activities** to refine strategy.

Conclusion

- **Social media analytics is evolving**, with companies refining their measurement techniques.
- Success depends on **accurate sentiment analysis, influencer tracking, and integrating analytics into decision-making**.
- Future improvements will enhance **data accuracy and business impact** through smarter algorithms and predictive insights.

<u>Predictive Analytics:</u>

Multiple Goals in Decision Making

1. Understanding Multiple Goals in Management Decisions

- Management decisions are rarely based on a **single** objective (e.g., profit maximization).
- Modern organizations **pursue multiple goals simultaneously**, which can sometimes **complement or conflict** with each other.
- Different **stakeholders** (shareholders, employees, managers, customers, community) have **varying and often competing goals**.
- Decision-making must **balance multiple objectives** rather than just focusing on one.

2. Examples of Multiple Goals in Organizations

- A profit-making firm may have goals such as:
      - Earning revenue and maximizing profit.
      - Expanding its business and product development.
      - Providing job security and benefits to employees.
      - Serving the community and ensuring corporate social responsibility.
      - Keeping shareholders satisfied while also offering competitive salaries to managers.

- In decision-making (e.g., investment choices), some goals **align** (growth increases profit), while others **conflict** (higher salaries reduce profit).

3. Challenges in Handling Multiple Goals

1. **Lack of Clarity** – Organizations may not have a clearly defined set of goals.
2. **Changing Priorities** – The importance of specific goals may shift over time or in different scenarios.
3. **Different Perspectives** – Goals and sub-goals are viewed differently at various levels (top management vs. employees).
4. **External Influences** – Goals change in response to market trends, competition, and regulations.
5. **Quantification Issues** – Measuring the impact of alternatives on multiple goals is difficult.
6. **Decision-Making by Groups** – Teams with different interests and priorities make collective decisions.
7. **Varying Goal Priorities** – Different stakeholders prioritize goals differently (e.g., investors focus on returns, employees on job security).

4. Methods for Handling Multiple Goals

Several techniques can be used to **incorporate multiple goals into decision-making models**:

1. **Utility Theory** – Assigns a numerical value (utility) to different choices to compare them.
2. **Goal Programming** – Uses optimization methods to **balance multiple goals** (not just maximize one).
3. **Constraints in Linear Programming (LP)** – Defines certain goals as constraints while optimizing another objective.
4. **Points System** – Assigns weights or scores to different goals to evaluate alternatives.

5. Key Takeaways

- **Multiple objectives must be considered together**, rather than focusing on a single measure of success.
- **Decision-making models often convert multiple goals into a single evaluation metric** (e.g., weighted score).
- **Analytic Hierarchy Process (AHP)** is one approach that helps in evaluating **multi-objective decisions**.
- Organizations need **flexible decision-making frameworks** to accommodate **shifting priorities** and **stakeholder needs**.

Sensitivity Analysis

1. Understanding Sensitivity Analysis

- Sensitivity analysis evaluates how **changes in input data or parameters** affect the **outcome** of a model.
- It helps **assess uncertainty** in decision-making by testing different scenarios.
- Used widely in **Management Support Systems (MSS)** to adapt models to changing conditions and improve decision-making.
- Enhances **confidence** in models by understanding their reliability under different assumptions.

2. Key Objectives of Sensitivity Analysis

- **Evaluating external variables** – Examines how uncontrollable factors (e.g., market trends) affect outcomes.
- **Assessing decision variables** – Tests the impact of internal decision factors on results.
- **Handling uncertainty** – Analyzes how inaccurate estimations affect model predictions.
- **Examining variable interactions** – Studies dependent relationships between input variables.
- **Ensuring robustness** – Checks if decisions hold under different conditions.

3. Applications of Sensitivity Analysis

- Revising models to **reduce excessive sensitivity**.
- Adding **details** to improve model accuracy.
- Obtaining **better estimates** for uncertain variables.
- Modifying **real-world systems** to minimize sensitivity risks.
- **Monitoring actual results** for continuous improvements.

4. Types of Sensitivity Analysis

A. Automatic Sensitivity Analysis

- Performed in **quantitative models** (e.g., Linear Programming - LP).
- Identifies the **range** within which an input can change **without significantly impacting** the solution.
- Limited to **one variable change at a time**.
- **Fast and efficient**, requiring minimal computational effort.
- Examples: Used in **Solver, Lindo**, and LP reports.

B. Trial-and-Error Sensitivity Analysis

- Involves manually changing inputs and **re-solving** the problem multiple times.
- Helps discover **better solutions** through iterative experimentation.
- Commonly performed using tools like **Excel modeling software**.
- Includes two approaches:
    1. **What-If Analysis** – Examines different scenarios by changing inputs.
    2. **Goal Seeking** – Adjusts input values to achieve a specific target output.

5. Key Takeaways

- Sensitivity analysis ensures **flexibility in decision-making**.
- Helps in **risk management** by identifying key **vulnerabilities** in models.
- Provides insights into **how sensitive a decision is** to variable changes.
- Supports **better planning and strategic decision-making** by exploring alternative scenarios.

Notes on Goal Seeking

1. Understanding Goal Seeking

- **Goal seeking** is a **backward solution approach** that calculates input values needed to achieve a specific target output.
- It is widely used in **decision-making models** to determine necessary conditions for achieving business objectives.
- Helps managers make **data-driven decisions** by working backward from a defined goal.

2. Examples of Goal Seeking

- Determining the **R&D budget** required to achieve a **15% annual growth rate by 2018**.
- Finding the **number of nurses** needed to reduce **emergency room waiting time** to under **10 minutes**.
- Setting **interest rates** in financial models to achieve a **net present value (NPV) of zero** (used in financial planning).

3. Applications of Goal Seeking

A. Computing Internal Rate of Return (IRR)

- Used in **financial planning models** (e.g., in Excel).
- Determines the **interest rate** at which **NPV equals zero**.
- Example: Given a set of **annual returns**, goal seeking can find the **required interest rate** for a balanced investment.

B. Computing Break-Even Points

- Identifies the **quantity of production** at which **profit equals zero**.
- Helps businesses determine **how much they need to sell** to cover costs.
- Essential for **profit planning and cost analysis**.

4. Goal Seeking vs. Sensitivity Analysis

Feature	Goal Seeking	Sensitivity Analysis
Approach	Backward-looking	Forward-looking
Focus	Finding required inputs to reach a goal	Evaluating how output changes with input variations
Example	Finding the required price to achieve a profit target	Checking how profit changes when costs increase
Use Case	Financial planning, break-even analysis	Risk assessment, scenario planning

5. Importance of Goal Seeking in Decision Support Systems (DSS)

- Ensures **managers can test different scenarios easily**.
- Supports **what-if analysis**, helping businesses make informed strategic decisions.
- Helps in **forecasting and planning** by determining required inputs for a desired outcome.