

Unit-5

Social Analytics

Farmer defined: Social analytics monitoring, measuring & interpreting digital interactions & relationships of people, topics, ideas & content.

2). Social analytics include mining the textual content created in social media for the purpose of gaining insight about existing & potential customer's current & future behaviour towards a firm's products & dislikes towards the sites & dislikes of the service.

3) Based on this def & the current practice, Social analytics can be classified into two different but not necessarily mutually exclusive branches

- (i) Social Network analysis
- (ii) Social media analysis

Social Network Analysis

A Social network or social network analysis is a social structure composed of people linked to one another, with some type of connections/relationships

- (i) The Social network perspective provides approach to analyzing structure & dynamics of social entities

Si: analyzing employee collaboration in a company to promote teamwork

- (ii) Social network analysis studies relationship between patterns, diversity by individuals & to understand how networks change over time, identifying popular users in a social media platform

- (iii) Social network analysis combines ideas from Psychology, Sociology, Statistics & graph theory to map friendships, study relation shape & connections

Si: using graph theory to map friendships in a school

- (iv) Social network analysis began developing mathematically in the 1950's with key theories & methods emerging in the 1980's
- (v) A social network is a theoretical construct useful in the Social sciences to study relationships between individuals, groups, organizations or even entire societies

- (vi) social networks are self-organizing, emergent & complex, such that a globally coherent pattern appears from the local interaction of the elements that make up the system

- (vii) Few typical Social network types that are relevant to business activities

- A. Communication networks C. Criminal networks
- B. Community D. Innovation

(A) Communication Networks

- Many communication concepts developed by communication scholars
- Many communication from one source to another & can be represented as a Social network
- Telecommunication companies are tapping into this rich information source to optimize their business practices & to improve customer relationships
- Communication studies in action & how social media platforms influence political opinions, combining aspects of sociology, psychology & political science

(B) Community Networks

- Once limited to local interactions, now operate online through social networking tools
- These extract general valuable data, enabling companies to uncover actionable insights
- An online community is group of Facebook members share interests, communicated through information generating data that companies can use for enhancing product development

(C) Colonial Networks

- Criminology much attention has been paid to the Social networks among criminal actors
- Studying going, murders, & other illegal activities of a cluster of outlaws. Who goes on activities or a series of outlaws.

(D) Innovation Networks

- Business studies on the spread of ideas & innovations to a robust environment where new ideas are shared & adopted among members of a social network.
- The idea is to understand why businesses are more innovative & why some companies are easily adopted of ideas & innovations.
- An innovation network in a social network ~~refers~~ has influence on Instagram's success and how influencers & their followers to adopt different trends, causing their trends to spread.

(D) Social Network Analysis Methods

- SNA is the systematic examination of network
- SNA views social relationships in terms of network theory, consisting of nodes & connecting lines.
- These networks are often represented using social network diagrams, where nodes are represented as points & ties are represented as lines.

- A. Connections
 - Hornophilia refers to the tendency to connect with those who share similarities with them rather than with people who are different.

- * Multiplicity: refers to different types of connections or interactions that exists between two people in a relationship.
- * Mutuality/reciprocity: the extent to which two actors reciprocate each other's friendships or interactions
- * Network closure: refers to how connected or complete a social network is
- * Proximity: refers to the tendency for people to form stronger connections (or relationships) with others who are geographically closer to them

B. Distributions

- * Bridge: who connects two separate groups or people that don't interact with each other. They act as a link, usually through weaker connections to help information from both groups.
- * Centrality: refers to different ways to measure how important or influential a node is within a network
- * Density: refers to how many direct connections there are in a network compared to the total number of connections that could possibly exist
- * Distance: refers to the smallest number of steps (or connections) needed to link two people in a network

C. Segmentation

- * Clusters are groups where members are directly connected to each other, while social circles are more loosely connected, with some members not directly tied
- * Clustering coefficient measures how likely it is that two people who are connected to the same person are also connected to each other
- * Cohesion refers to how strongly the members of a group are connected to each other through bonds or relationships

Social Media Definition & concepts

- * Social Media refers to the technologies that empower social interactions among people on which they create/share/exchange information, ideas & opinions or virtual communities & networks.
- * It is a group of internet-based software applications that build on the ideological & technological foundation of web 2.0 & that allows the creation & exchange of user generated content.
- * Social media depends on mobile & other networks
- * Social media technologies to create highly interactive platforms for individuals & communities to share, co-create, discuss & modify user-generated content

* Web-based social media technologies, which have evolved since the 1990's include various platforms like blogs, social networks & forums, communities allowing anyone to publish & share information.

* Web-based social media are different from traditionally such as newspaper, television & film, as they are comparatively inexpensive & accessible to enable anyone.

Key characteristics b/w Social & Industrial media

* Quality

* Reach

* Frequency

* Accessibility

* Usability

* Updatability

Quality In industrial publishing content quality is usually more consistent & controlled by a publisher. In contrast social media content varies greatly ranging from high-quality to low or even harmful content.

Reach Both industrial & social media technologies provide scale & are capable of reaching a global audience.

Industrial media, typically use a centralized framework for organization, production, whereas social media is decentralized, allowing multiple individuals or groups to create & share content.

unlike industrial media, which is controlled by a few organizations.

Frequency

Compared to industrial media updating & reposting on social media platforms is easier, faster & cheaper & practiced more frequently, resulting in fresh content.

Accessibility

The means of production for industrial media are typically government & corporate & are costly, whereas social media tools are generally available to the public at little or no cost.

Usability

Industrial media production typically requires specialized skills & training. Most social media platforms are easy to use, requiring only basic skills that many people already have.

Updatability

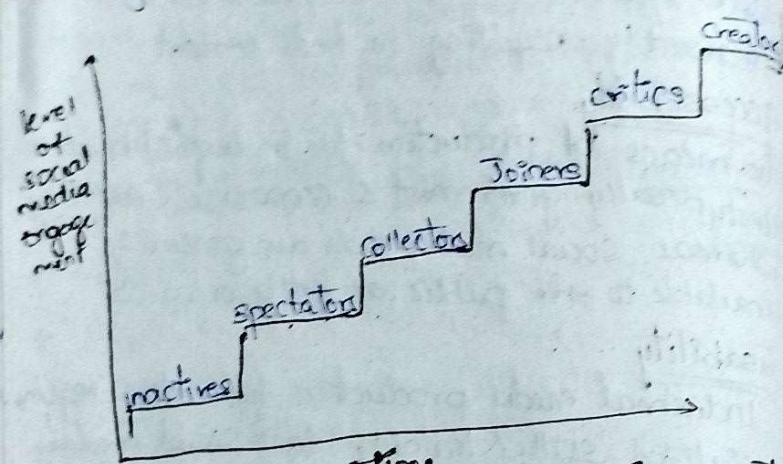
Industrial media, once created, cannot be altered, whereas social media can be altered almost instantaneously by comments/edits.

How do people use Social Media?

* Not only are the No. of social networking sites growing, but so is the degree to which they are engaged with the channel.

* The No. of users on social networking sites is increasing also their level of engagement is increasing.

- * Brogan & Bastone (2011) presented research that arranges users according to how actively they use social media & tracked evolution of these user segments over time.
- * They listed six different engagement levels



evolution of Social Media user engagement

- * The six levels of social media engagement as identified by Brogan & Bastone are:
 - * **inactive**: individuals who do not participate in any form on social media, either by viewing (or) creating content
 - * **spectators**: users who view content but do not interact with it like watching videos or reading articles
 - * **collectors**: people who organize or collect content, such as bookmarking, tagging or sharing posts

- * **Joiners**: users who join social networks or groups but may not actively create or comment on content
- * **critics**: individuals who comment, review, or provide feedback on content created by others.
- * **creators**: people who produce original content, such as blog posts, videos or artwork.
- * "Now roughly 82 percent of the adult population online is in one of the upper categories" said Bastone. "Social media has timely reached a state of mass adoption."

Social Media Analytics

- * SMA is the process of using tools & methods to analyze the large amount of content on social media, to analyze helping organizations improve their competitiveness
- * SMA is rapidly becoming a new force in organizations around the world, allowing them to reach out to & understand consumers as before.
- * In many companies, it is becoming the tool for integrated marketing & communications strategy
- * The exponential growth of social media outlets from blogs, fb & twitter to linkedin & youtube & analytics tools that tap into these rich data sources offer organizations the chance to join a conversation with millions of customers around the global every day

* According to Harvard Business Review, nearly two-thirds of companies are still planning to use social media, though are still figuring out how to effectively integrate it into their strategies.

* Many companies view social media now as a promotional tool, overlooking its potential to analyze consumer conversations & gain insights that can improve business outcomes.

→ Here are some of the results from the HBR (Harvard Business Review) analytic services survey (HBR 2010):

* Three-quarters (75%) of the companies in the survey said they did not know where their most valuable customers were talking about them.

* Nearly one-third (31%) do not measure effectiveness of social media.

* Less than one-quarter (23%) are using social media analytic tools.

* A fraction (7%) of participating companies are able to integrate social media into their marketing activities.

Measuring the Social Media Impact

* Social media holds valuable insights in user-generated content across various platforms. To uncover these insights, analytic tools can help navigate through vast amounts of content.

* Once goals are set, these tools can effectively measure the impact of social media efforts.

- Descriptive analytics
- Social network analysis
- Advanced analytics

Descriptive Analytics

uses simple statistics to identify activity characteristics & trends, such as how many followers you have, how many reviews were generated on FB, & which channels are being used most often.

Social Network Analysis

follows the links between friends & followers to identify connections of influence as well as the biggest sources of influence.

Advanced Analytics

includes predictive analytics & text analysis that examine the content in online conversations to identify patterns, sentiments, emerging trends & potential future behaviors, helping business optimize strategies & enhance engagement.

Descriptive Analytics

Descriptive Analytics use basic statistical methods to summarize & interpret social media activity. It helps organizations understand past performance & trends.

- * This include metrics like the No. of followers, likes, shares, comments & reviews on platform like Facebook, Twitter or Instagram.
- * It helps answer questions like "How many people engaged with this post?" or "which content performed best?" The primary goal is to provide a clear picture of past & current Social media activity.

Descriptive Analytics Technique.

- * Basic statistics: Techniques such as mean, median & mode to summarize data.
- * Frequency Analysis: counting the no. of occurrences of specific actions

Social Network Analysis (SNA)

- * SNA maps & analyzes the relationships between individuals, groups or organization within a network.
- * In Social media, it tracks the connections between friends, followers, fan, or even customers, identifying key influences or central in a network.
- * SNA can reveal which users have the most followers or the highest level of engagement.
- * This allows organizations to focus on influential users or groups that may have the most impact on spreading messages or shaping opinions.

Techniques

Graph Theory:

Representing the network as a graph with nodes & edges. Metrics such as degree centrality & closeness centrality are calculated.

cluster analysis:

Grouping users based on similarities in their interactions or behaviors, identifying communities within the network.

Advanced Analytics

- * Advanced analytics goes beyond basic measurements to offer deeper insights into future trends & behaviors.

- * It includes predictive analytics, which uses historical data to forecast future outcomes such as predicting customer behavior, sales or brand perception based on past Social media activity.

Text analytics

Analyzes the content of online conversations such as comments, tweets & reviews to uncover sentiment, identify emerging trends, or detect issues related to a product or service.

- * These tools help organizations make data-driven decisions, plan future campaign & address customer concerns productively.

Predictive Analytics

Regression Analysis: using past data to predict future outcomes, like the likelihood of a customer purchasing based on social media activity.

Machine learning: training models to recognize patterns & make predictions about future behavior.

Text Analytics: processing (NLP) instruments
Natural Language: sentiment analysis techniques like tokenization, sentiment analysis & part-of-speech tagging to analyze text data & extract meaningful insights from social media posts, comments or reviews.

Sentiment Analysis: analyzing the emotional tone of text to understand public opinion or customer sentiment towards a brand, product or service.

Prescriptive Analytics

PA is the process of using data to forecast future outcomes. The process uses data analysis, machine learning, artificial intelligence & statistical models to find patterns that might predict future behavior.

Optimization: PA uses mathematical models, optimization techniques & algorithms to identify the most effective solution given set of objectives & constraints.

It may recommend other optional pricing strategies to maximize profit, the best route to delivery to minimize cost or the most efficient route. For delivery trucks, some optimization techniques use linear programming, integer programming, mixed integer programming.

Multi-criteria Decision Making (MCDM)

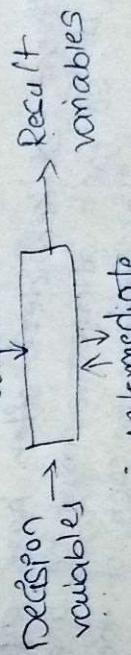
on Multi-criteria systems.
In real world decisions problems, there are often multiple conflicting objectives to consider.

MCDM techniques are used to evaluate & prioritize these different criteria when making a decision.

- * In project selection we may need to prioritize low-cost, high-quality & risk. A project that is low-cost might take longer & one that is high-quality could be more expensive.

Quantitative Models

All quantitative models are typically made up of four basic components. result variables, decision variables, uncontrollable variables & intermediate variables.



Components of Models

<u>Area</u>	<u>Decision Variable</u>	<u>Result Variable</u>	<u>constraint variable & parameter</u>
Financial investment	investment alternatives	Total profit	
market analysis	amounts	risk rate of return on investment (ROI)	Inflation rate, competitor, customer income, competitor actions
market analysis	amounts		

linear programming

LP is used to find the optimal solution to resource allocation problems, where the relationship between variable are linear.

* It helps in maximizing or minimizing an objective function subject to constraints.

Ex - A factory uses LP to decide how many units of different products to produce, given limited resources like labor & material, in order to maximize profit.

Multiple Goals

* The analysis of management decisions aim at evaluating how well each option helps to achieve the company's goals. Since most problems involve multiple goals that may conflict. It's important to consider how each alternative affects these goals.

* Different stakeholders often have different goals, so each alternative must be analyzed in terms of its impact on each of these goals.

Today's management systems are complex, aiming to achieve multiple, sometimes conflicting goals, requiring analysis of each alternative's impact on these goals.

* consider a profit-making firm: to earn money, the company wants to grow, develop, its products & employees, provide job security to its workers & serve the community.

* Managers want to satisfy the shareholders & at the same time enjoy high salaries & also employee want to increase their take-home pay & benefits.

* When a decision is to be made - say, about an investment project. Some of these goals complement each other where other conflicts

Some of difficulties that may arise when applying to multiple goals are

1. It is usually difficult to obtain a clear statement of the organization's goals.
2. The decision maker may change the importance assigned to specific goals over time or for different decision scenarios.
3. Goals & Subgoals are viewed differently at various levels of the organization & within different departments.
4. Goals change in response to changes in the organization & its environment.

5. The relationship b/w alternatives & their role in determining goals may be difficult to measure

6. Complex problems are solved by groups of decision makers, each of whom has a personal agenda.

7. Participants assess the importance of the various goals differently.

Several methods for handling multiple goals in decision-making include

1. utility theory: combining different goals into a single utility measure to compare different alternatives

2. goal programming: Setting specific target goals & minimizing the deviations from these targets.

3. expression of goals as constraints: using LP

Formulating each goal as a constraint & optimizing the solution

4. points system: Assigning points or weights to different goals & summing them up to evaluate alternatives

Sensitivity Analysis

* SVA is the process of evaluating how changes in input data, parameters or assumptions affect the outcomes of a model or decision. It helps to understand the model's behavior, evaluate the impact of uncertainties & improve decision-making by testing the robustness of solutions under different scenarios.

Supply chain

Input: customer demand forecasts & supplies, delivery times

Output: Total storage costs & the no. of available products

* Sensitivity analysis evaluate how changes in demand or delivery times affect storage costs & product availability

Investment Decision

Input: interest rates & market growth assumptions

Output: projected returns from investments

* Sensitivity analysis examine how variations in interest rates or market growth impact the expected returns

* SVA is crucial in PA because it helps models adapt to changing conditions & different decision-making needs.

1. It improves understanding of the model & its purpose & allows managers to test & adjust input data to ensure confidence in the results

2. A company planning its budget. For the next year, sensitivity analysis lets the manager see how changes in factors like sales or raw material costs affect overall profits. This helps the company prepare for various scenarios & make better financial decisions.

3. SA tests relationships such as - the impact of changes in external variable on outcome. A farm assesses how changes in weather affect crop yield.

4. impact of changes in decision variables on outcome. A company tests how adjusting production levels affects profit.

5. effect of uncertainty in estimating external variables. A retailer evaluates how uncertain sales forecasts impact inventory levels.

6. effects of different dependent interactions among variables.

7. A factor examines how changes in both labor & machine efficiency affect overall production output.

5. robustness of decisions under changing conditions
6. A logistics company tests how changes in fuel prices & delivery times affect the transportation strategy.

* Two types of sensitivity analyses are

- ① - Automatic sensitivity analysis
- ② - Trial-and-Error sensitivity analysis
 - (a) what-if-analysis
 - (b) goal seeking

* Decision modeling with spreadsheets

Automatic Sensitivity Analysis

* ASA is performed in standard quantitative model implementations such as linear programming (LP)

* ASA is a method used to evaluate how the output of a model (or) decisions change in response to variation in input parameters.

* ASA is usually limited to one change at a time & only for certain values variables.

* sensitivity analysis is provided by solver & almost all other software packages. solver is a tool often used in spreadsheet.

* software like microsoft excel to perform sensitivity analysis & solve optimization problems like linear programming (LP)

* MBI corporation is using sensitivity analysis to understand how changes in certain factors can

impact their net profit to 22.61%

* they are looking at a constraint related to marketing, which limits how much of a product (CC-8) can be marketed

* the sensitivity analysis shows that if the marketing constraint is reduced by one unit, their net profit would increase by \$1,333.33. This result holds true as long as the constraint doesn't decrease to zero.

Trial & Error sensitivity analysis

* the impact of changes in any variation in several variables can be determined through a simple trial & error approach.

* you ~~can~~ change some input data & solve the problem again.

* when the changes are repeated several times, better & better solutions may be discovered.

* which is easy to conduct when using appropriate modeling software. Such as Excel, has two approaches:

- (i) what if analysis
- (ii) goal seeking

1. what-if analysis's

It is a structure as what will happen to the solution if an input variable, an assumption or a parameter value is changed?

- * what will happen to the total inventory cost if the cost of carrying inventories increased by 10%?
- * what will be the market share if the advertising budget increases by 5%?
- * with the appropriate user interface, it is easy for managers to ask a computer model these types of questions & get immediate answers.
- * they can perform multiple cases & then by change the % or any other data in the question as desired.
- * The decision maker does all this directly without a computer programmer.
- * Ex: When the user changes the cell containing the initial sales (from 100 to 120) & the sales growth rate the program immediately recomputes the value of the annual net profit cell (from \$127 to \$1482)

Goal Seeking

- * It calculates the values of the input necessary to achieve a desired output (goal). It represents a backward solution approach.

Ex

- * what annual R&D budget is needed for an annual growth rate of 15% by 2018?

how many nurses are needed to reduce the average waiting time of a patient in the emergency room to less than 10 min.

fix Goal seeking for savings goal in Rufe

Scenario: want to save 50,000

Known info: you can save 4000 each month

Goal: how many months it takes to reach

Goal seeking process

see the total saving goal to 50,000

Result

After applying goal seeking, it will take 13 months to save 50,000

Decision Making with Spreadsheets

Unit-IV

Security First Insurance Keeps its connection with policyholders

* challenge
* solution
* results

* Security First insurance is one of the largest homeowners insurance companies in Florida.

* Headquartered in Ormond Beach. It employs more than 80 insurance professionals to serve its nearly 190,000 customers

Challenges

* Florida's Hurricane exposure
* Security First's commitment
* surge in claims after hurricanes
* Evolving communication channels
* Need for proactive & integrated approach

① Florida's Hurricane exposure

Florida faces the highest exposure to hurricanes in the U.S. with an average of 12 named storms & 9 hurricanes annually impacting property & people.

② Security First's commitment

The company is financially strong enough to withstand multiple natural disasters & promises to support customers "storm after storm, year after year."