



## Unit-2

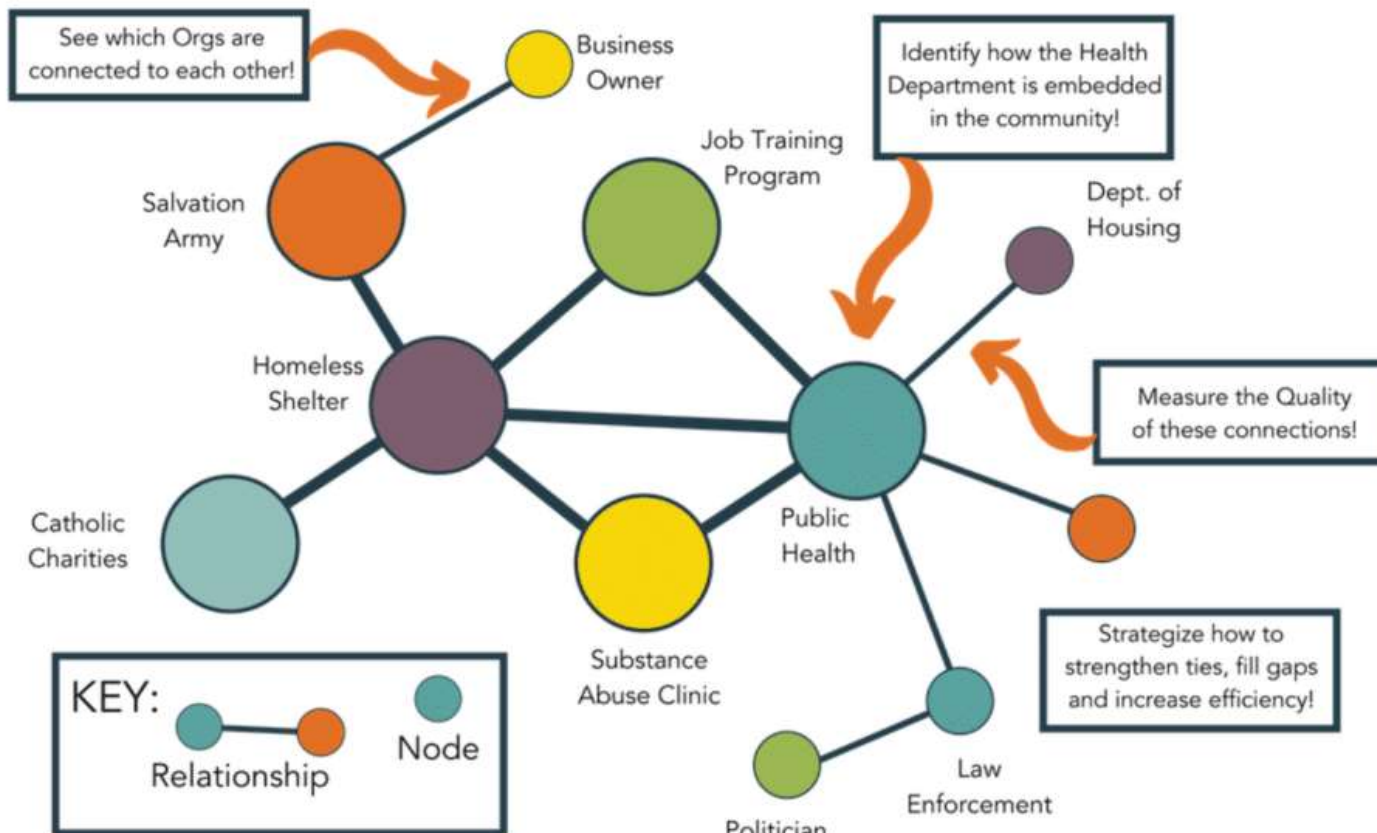
# **The Social Networks Perspective And Its Visualization**

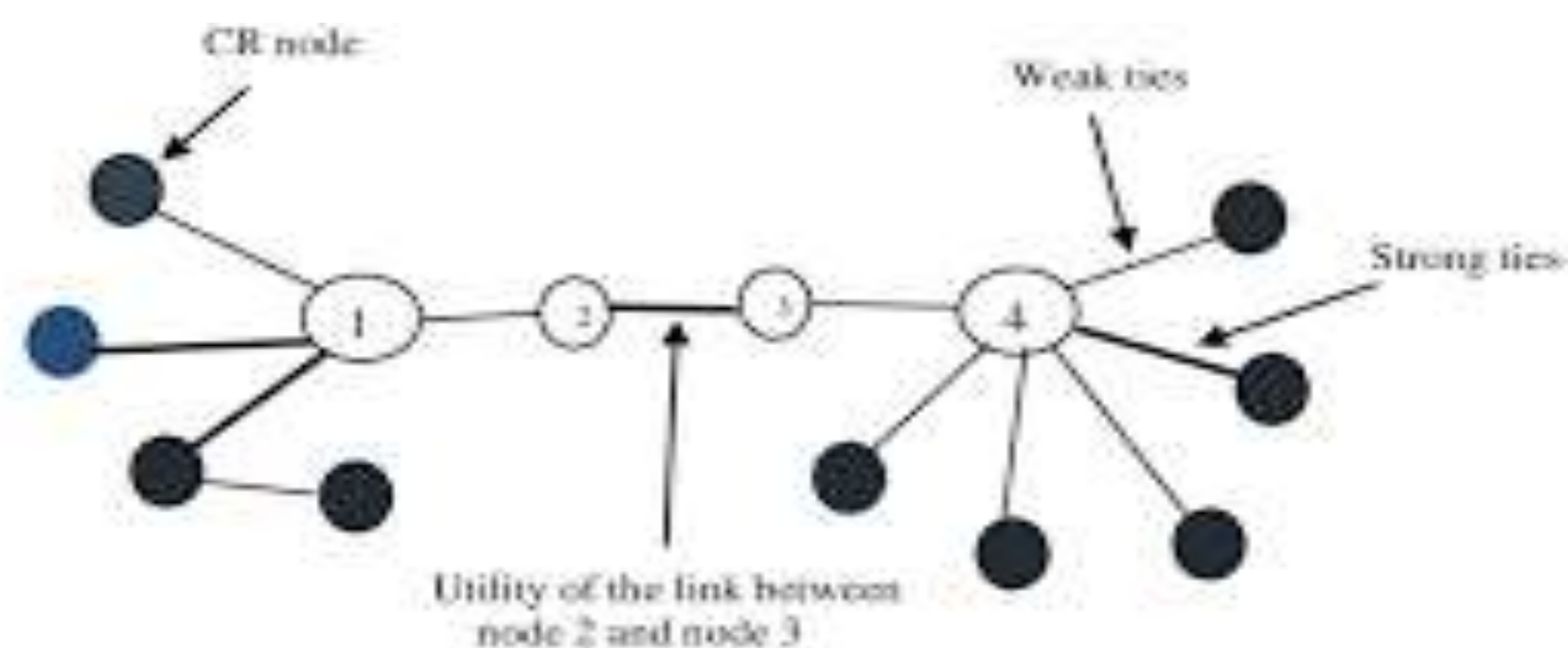
By

**Dr. M. K. Kodmelwar**

- Nodes represent individual actors (people, organizations, etc.), while ties represent the relationships or connections between these actors. These connections can be based on various forms of interaction, including friendships, family relationships, professional collaborations, or online interactions.

- Nodes:
- Nodes are the individual units within a network.
- They can be people, organizations, groups, or even concepts.
- In a network diagram, nodes are typically represented as points or circles.
- For example, in a network of friends, each person would be a node.





Node 1 & 4: Highest degree nodes

Node 2 & 3: bridge nodes connecting the two ends of the network

# Introduction to Social Media Influence

Business  
Perspective

Societal  
Perspective

Economic  
Perspective



Consumer  
Perspective

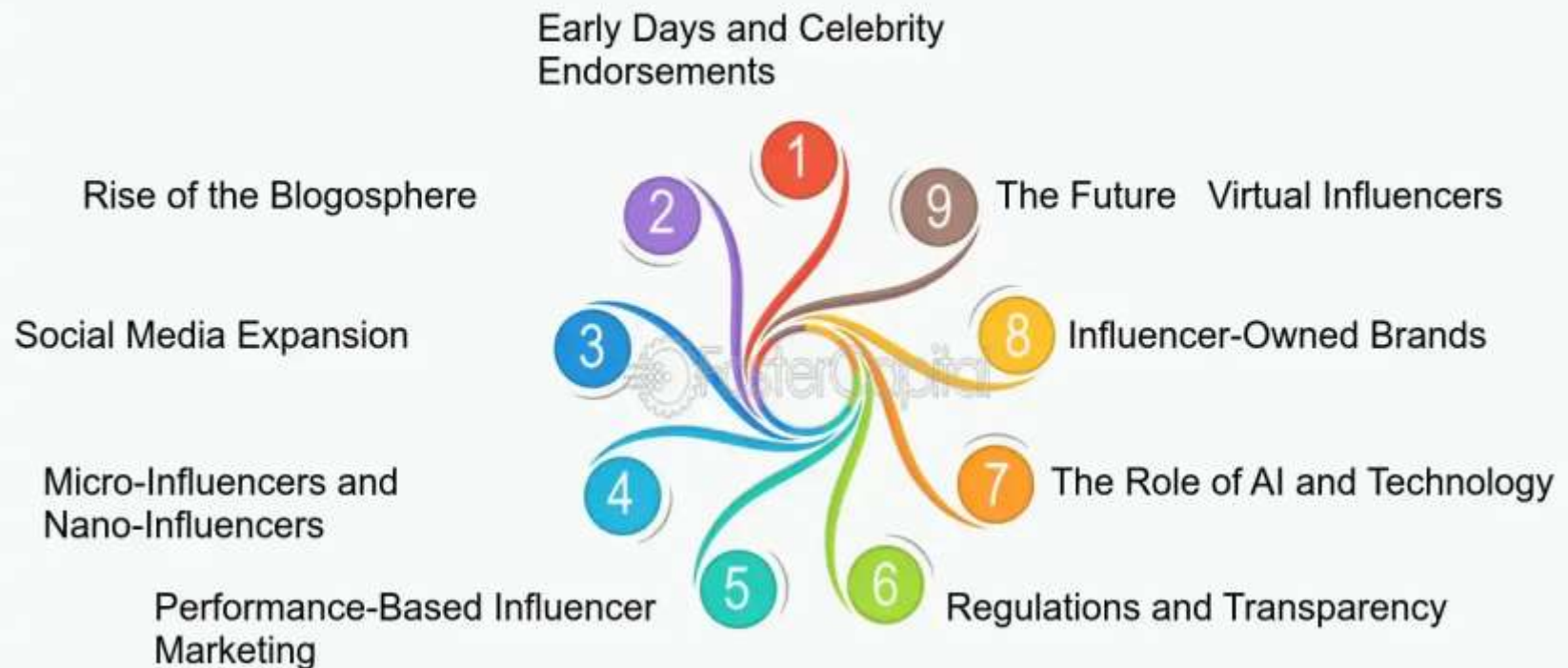
Psychological  
Perspective

- 1. Business Perspective: companies see social media influencers as vital partners in reaching target audiences. For example, a beauty brand might collaborate with a makeup artist on instagram to showcase their products. The artist's followers, who trust their recommendations, are more likely to purchase the product.
- 2. Consumer Perspective: Consumers often rely on influencers for product reviews and recommendations. An influencer's endorsement can serve as social proof, reducing the perceived risk of trying a new product.

- 3. Societal Perspective: On a broader scale, influencers have the power to shape public opinion and cultural trends. They can bring attention to social issues, inspire change, and even affect political outcomes by mobilizing their followers.
- 4. Psychological Perspective: The influence of social media also extends to the psychological realm, where the constant exposure to influencers' curated lives can impact an individual's self-esteem and body image.
- 5. Economic Perspective: Influencers contribute to the gig economy, representing a shift in how people earn a living—prioritizing flexibility, independence, and passion-driven careers over traditional employment.



# The Evolution of Influencer Marketing



# Sociology

- It is a social science that focuses on society, human social behaviour, patterns of social relationships, social interaction, and aspects of culture associated with everyday life.
- While some sociologists conduct research that may be applied directly to social policy and welfare, others focus primarily on refining the theoretical understanding of social processes.
- Subject matter can range from micro-level analyses of society (i.e. of individual interaction and agency) to macro-level analyses (i.e. of systems and the social structure).

- Traditional focuses of sociology include social stratification, social class, social mobility, religion, secularization, law, sexuality, gender, and deviance.
- sociology has gradually expanded its focus to other subjects and institutions, such as health and the institution of medicine; economy; military; punishment and systems of control; the Internet; education; social capital; and the role of social activity in the development of scientific knowledge.

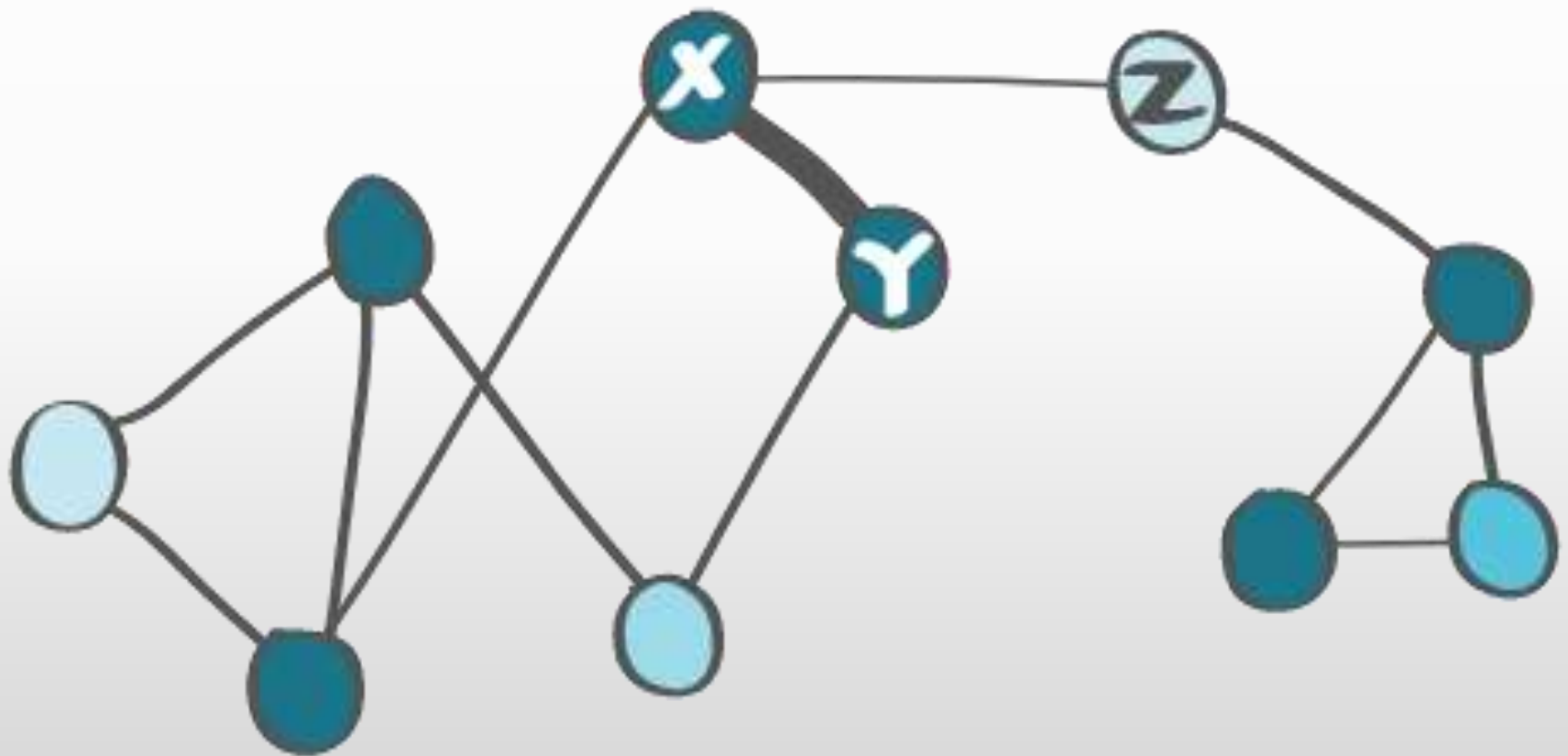


# Social Network

- There is some organization in our lives because of these social groups. Within these groups, we have our *social networks*.
- Facebook or Twitter.
- In the offline world, social networks refer to the social ties that link us together with other people.
- These ties include your family, friends, acquaintances, classmates, colleagues, neighbors, etc.



INDIVIDUAL



- Social Network Theory is the study of how people, organizations or groups interact with others inside their network.
- Understanding the theory is easier when you examine the individual pieces starting with the largest element, which is networks, and working down to the smallest element, which is the actors.





# Social group

- As a person, you may belong to many different types of groups: a religious group, an ethnic group, your workplace colleague group, your college class, a sports team, etc.
- These groups can also be called *social groups*. We have something in common with others in the same group, we identify with the group, and the group can create a sense of belonging for us.



- In the first part of your life, you are likely influenced fundamentally by *primary groups*. Your family and friends are in this group. Your family shaped your basic values in life.

- Secondary groups are larger, more anonymous, and impersonal compared to primary groups. They also tend to be more short-term.
- Such groups are often based on shared interests, hobbies, or activities.
- For example, forming a temporary task group to plan a holiday party at work or organizing a reading group before an exam.

Secondary group members interact based on social statuses. If you're a worker you may belong to a union; if you're a student, you may be in a college class with a lot of other students; if you're a professor, you may belong to a professional association.



- As you interact more with people in your larger secondary group, these groups may break down into primary groups.
- Stronger friendships may form between you and a few others in the class of 150 students in Statistics 101, and you then become close long-term friends who influence one another.
- This is an example of how secondary groups may break down into primary groups.



# Types of Networks

- Ego-centric networks are connected with a single node or individual. For example, you, the node, connected to all your close friends.
- Socio-centric networks are closed networks by default. Two commonly-used examples of this type of network are children in a classroom or workers inside an organization.
- In open-system networks, the boundary lines are not clearly defined. A few examples in this type of network are America's elite class, connections between corporations, or the chain of influencers of a particular decision.
- Due to the lack of clearly-defined boundaries, this type of network is considered the most difficult to study.

- An actor's location inside the social network can be an indicator of the strength of the ties associated with him. A person near the center of the network often has more ties -- or links -- between himself and the other actors, as opposed to someone on the outer fringes of a network.
- A person on the outer edge of the network could be connected to the network by only one link.

- **Influencers in social media** are people who have built a reputation for their knowledge and expertise on a specific topic. They make regular posts about that topic on their preferred social media channels and generate large followings of enthusiastic, engaged people who pay close attention to their views. Brands love social media influencers because they can create trends and encourage their followers to buy products they promote.

# Mega-Influencers

- Mega influencers are the people with a vast number of followers on their social networks. Although there are no fixed rules on the boundaries between the different types of followers, a common view is that mega-influencers have more than 1 million followers on at least one social platform.
- Many mega-influencers are celebrities who have gained their fame offline – movie stars, sportspeople, musicians, and even reality television stars. Some mega-influencers have gained their vast followings through their online and social activities, however. Only major brands should approach mega-influencers for influencer marketing, however. Their services will be costly, up to \$1 million per post, and they will most likely be extremely fussy about with whom they choose to partner. In virtually every case, mega-influencers will have agents working on their behalf to make any marketing deals.

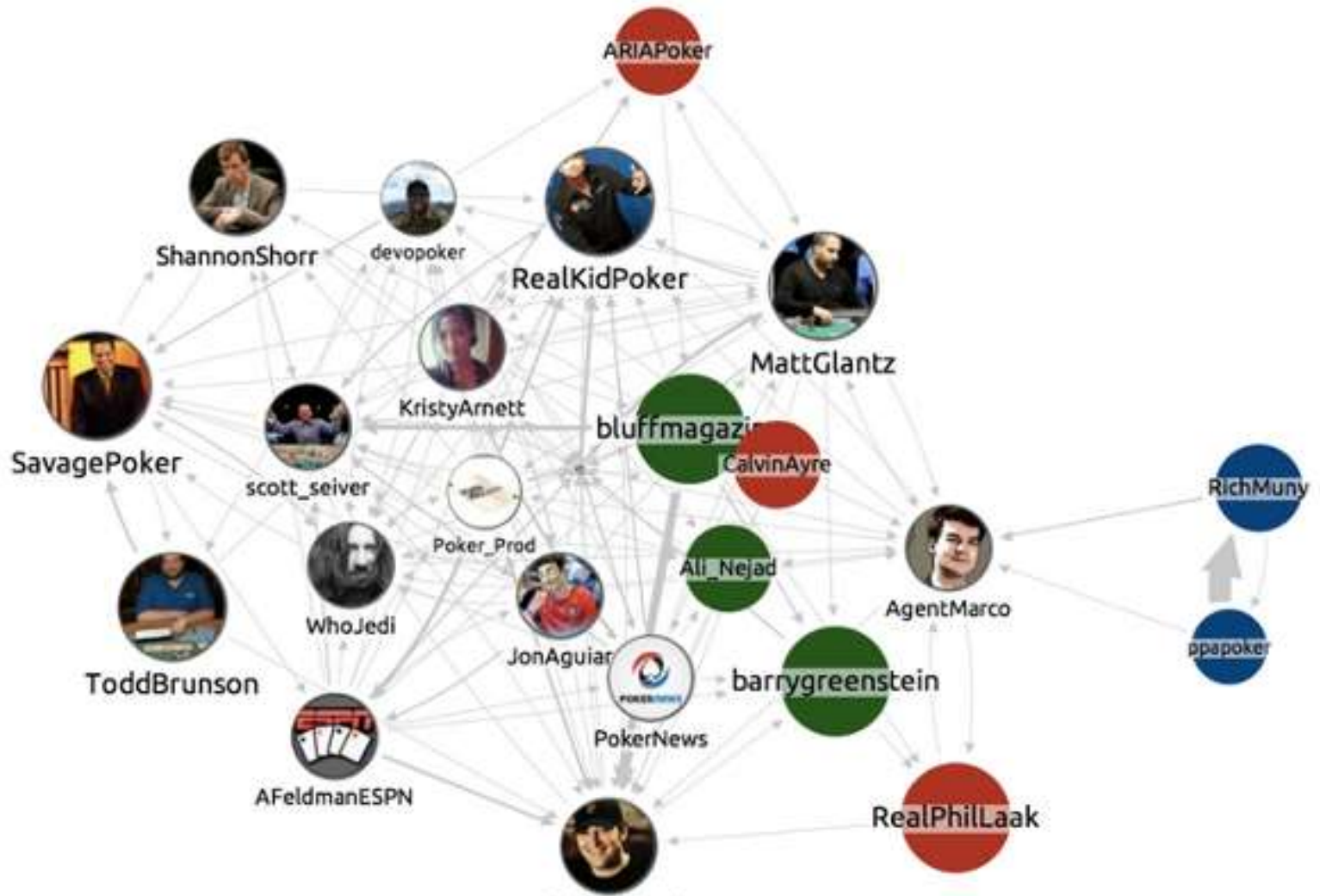


- A **social network graph** is a graph where the nodes represent people and the lines between nodes, called edges, represent social connections between them, such as friendship or working together on a project. These graphs can be either undirected or directed. For instance, Facebook can be described with an undirected graph since the friendship is bidirectional, Alice and Bob being friends is the same as Bob and Alice being friends. On the other hand, Twitter can be described with a directed graph: Alice can follow Bob without Bob following Alice.



# What is a social network?

- At their simplest level, social networks are graphs of social interactions and personal relationships.
- A social network can be easily understood and explored in a graph format, using people as nodes, relationships as edges and additional information (characteristics, preferences, affiliations, etc.) as properties. Sometimes other entities can be included as nodes, for example companies, products, groups or organizations.



A screenshot of an interactive Twitter network, created in KeyLines, featuring Poker experts filtered by their Betweenness value and sized by Klout score.

# Why analyze social connections?



- Network dynamics dictate the spread of information, news and ideas. They can help identify someone's tastes, opinions and activity.
- If we can understand a person's network, we will have a much deeper knowledge of them than if we assessed them in isolation.

- By studying a social network we can find influential people, anticipate peaks in demand for products or services, generate more targeted marketing approaches and predict illegal activity. On a more personal level, we can also build communities, identify vulnerable and isolated people and help people find new connections.

# Who needs to understand social networks?



- Anyone with an interest in understanding humans and their behaviors can benefit from analyzing and visualizing social networks. A few groups and associated use cases are listed below:
- **Sales and Marketing**
- Identify, find and target influential people, including decision makers and thought leaders
- Understand your customer's aspirations and requirements to better meet their needs (e.g. product recommendation mechanisms)
- Understand content and campaign propagation

- **Researchers and journalists**
- Discover breaking stories as they happen and understand information spread
- Find authoritative experts and well-connected sources
- Research connected individuals pertinent to a story
- **Government and law enforcement**
- Predict criminal activity by monitoring connections between suspects
- Understand gang dynamics, for example discover leaders, followers and new individuals being integrated into a group
- Find new leads of enquiry by mapping known connections between crime

- **Social networking sites**
- Allow users to interact with their connections and discover new ones in an enjoyable and visually engaging way
- Help users understand how they share their data and with whom.
- Discover and suggest community structures based on connections and shared interests

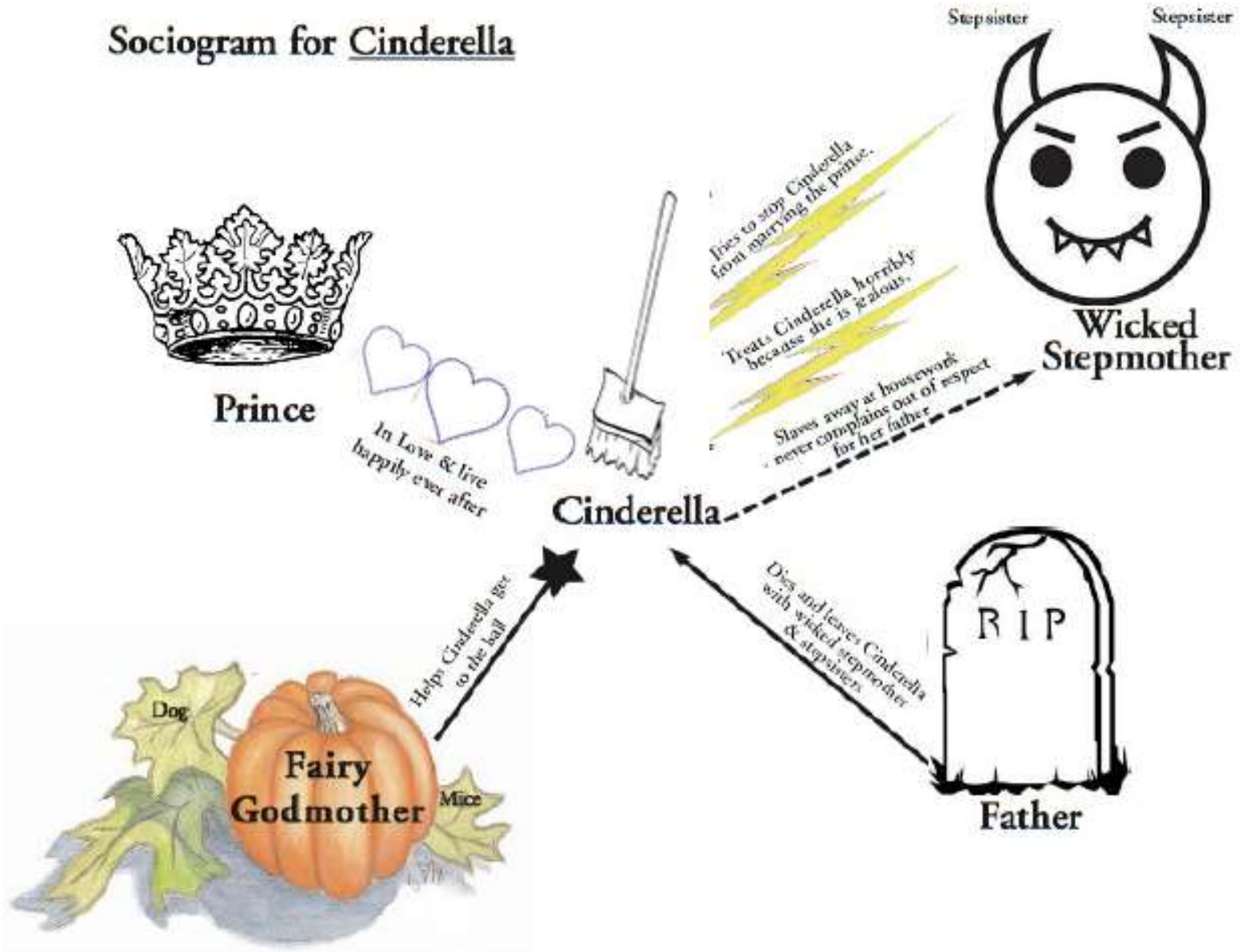




# What is a sociogram?

- A sociogram is a visual representation of the relationships among characters in a literary text. Students can make use of pictures, symbols, shapes, colors, and line styles to illustrate these relationships.

# Sociogram for Cinderella



- Graph drawing software, often at the core of visualization algorithms, has evolved from software of academic interest to widely spread interactive applications.
- Now, online social networking sites provide their own or third-party interactive visualizations for casual users to explore portions of their networks.
- These include tools for music discovery such as liveplasma ([liveplasma.com](http://liveplasma.com)), musicover ([musicover.com](http://musicover.com)), Lastfm's widget galleries ([lastfm.com](http://lastfm.com)), tools for visualizing and generating maps of people's own circle of friends, such as a myriad of facebook applications ([facebook.com](http://facebook.com)), lastfm's friend sociomap ([lastfm.com](http://lastfm.com)) and generic visualization sites such as IBM's Many Eyes ([manyeyes.alphaworks.ibm.com/](http://manyeyes.alphaworks.ibm.com/)).
- But there has been an explosion of tools that incorporate analysis and visualization, such as Pajek, JUNG, Tulip, visone.



# What is social network analysis?

- The aim of social network analysis is to understand a community by mapping the relationships that connect them as a network, and then trying to draw out key individuals, groups within the network ('components'), and/or associations between the individuals.
- A network is simply a number of points (or 'nodes') that are connected by links. Generally in social network analysis, the nodes are people and the links are any social connection between them – for example, friendship, marital/family ties, or financial ties.



# Top Food influencer in INDIA

- Priyanka Tiwari is a well-known Vlogger and YouTuber who is prominent for her food and travel vlogs on her YouTube channel. Born and brought up in Jaipur, she started her vlogging career in the year 2016. When she began making videos of traditional Rajasthani food, her YouTube channel earned many more subscribers.



- Kabita Singh is the proud mind behind Kabita's Kitchen. She is an Indian chef, food blogger, restaurant consultant, and a YouTuber from Uttar Pradesh who has gained popularity by sharing Indian cuisine recipes on her YouTube channel. Along with sharing recipes on her YouTube channel, she also shares her recipe details on her website [www.kabitaskitchen.com](http://www.kabitaskitchen.com).

- A journey he started on social media with only a single follower is now being followed by people from all over the nation. Karan Dua initially started his blog with the intent to share his mother's recipes with other homemakers and stay connected with this community. He now impacts a sizable crowd on social media and is no less than a trendsetter.

- A graduate from India's top institute, Institute of Hotel Management Catering Technology and Applied Nutrition, Hyderabad, Sanjay who is prominent by the name of Vahchef is most eminent for online recipes on his Youtube channel that was started in 2007 popularizing Indian food. He is not only a great chef but a connoisseur in cooking. He has inspired a lot of people to create simple food with ease and new dimensions. His mantra has always been that VahrehVah is all about inspiring others to cook.



- Kanak Kathuria is an enthusiastic chef who loves to create her recipes. She enjoys experimenting with the traditional recipes that she has learned from her mother and her grandmother. She creates cuisine that is a fusion of these recipes and flavors and cooking techniques of the contemporary world. Every one of her dishes is a gourmet experience in itself.

- Parth Bajaj is a blogger, a chef, a TV host, a food photographer and stylist, a recipe developer, and a self-taught home baker. He has been crushing the Instagram game for quite a while now, he has now started to achieve remarkable milestones on other platforms. He is one of the youngest and most successful food bloggers in the country. He is a firm believer in hard work and always doing something innovative. He likes to layout new ideas, and execute them, experimenting with new recipes.

- Shivesh Bhatia is a self-taught baker from Delhi who loves to simply create, style, and capture the most delectable desserts. His feed is filled with pictures and videos of desserts of various flavors and colors. Inspired by his maternal grandmother, Shivesh started baking when he was in class 11. When his grandmother passed away, he took up baking to honor her memory.

- Archit Agarwal is a food blogger whose recipes are inspired by different cuisines from around the world but have an Indigenous touch to them. His blog is a collection of easy to recreate delectable recipes that you can cook on your own. He also loves photography and his blog is a collection of the explorations of his favorite journeys both through gastronomy and traveling.

- Dhruv Shah is a food blogger and food stylist hailing from Ahmedabad who you can count on when searching for places to dine at. He perceives food as an art and an opportunity to showcase his creativity. He shares restaurant reviews that are more of a guide for a toothsome experience. His feed is full of delicious treats cooked to perfection. His brilliant pictures will surely fascinate your tastebuds.



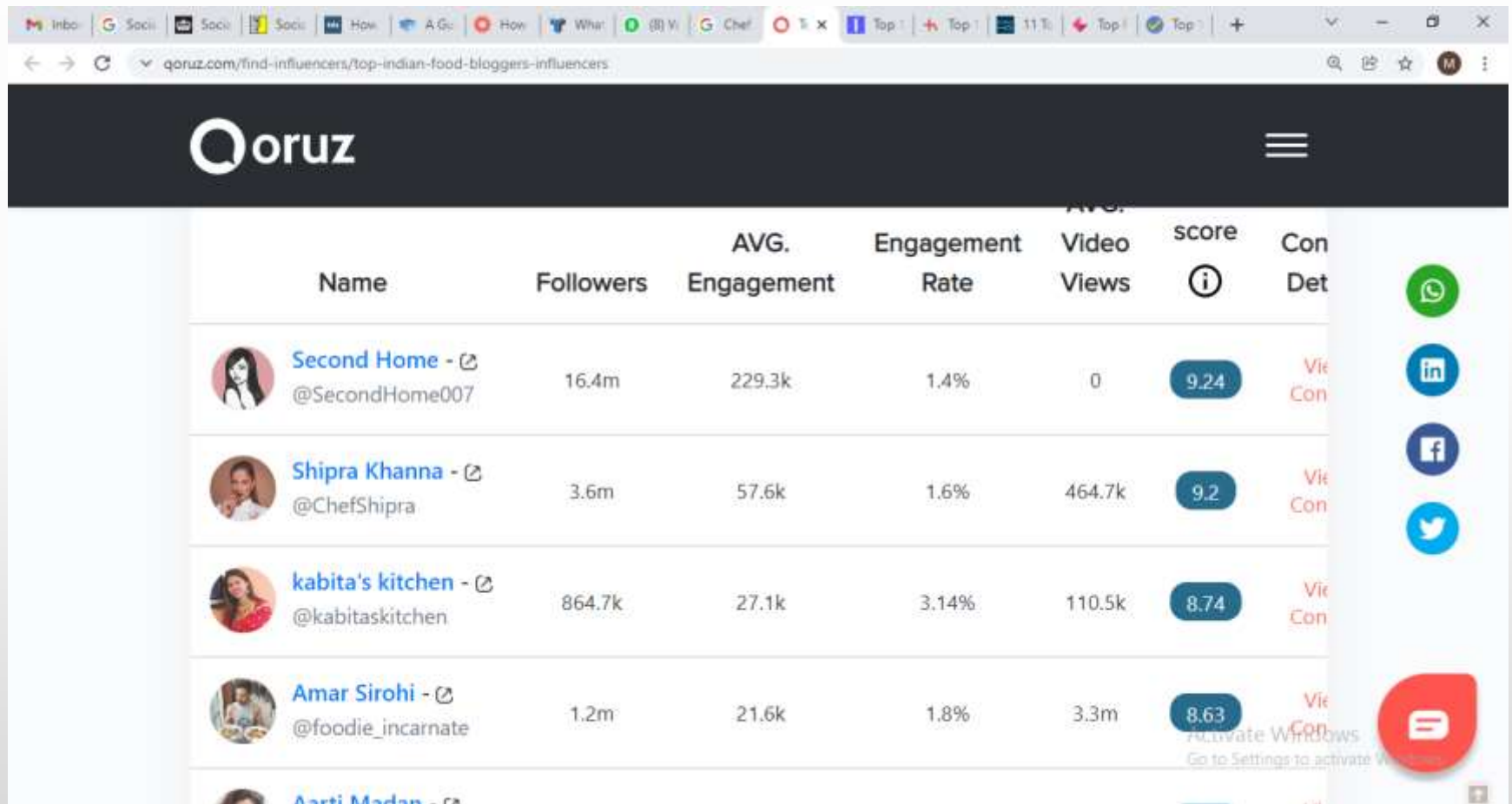
- Ashutosh Bhatt is a food and [travel content creator](#), and wow does he not give the best reviews and recommendations of restaurants. He shares the best of Delhi and all the places he has traveled to, from around the world which is over 20 countries! His feed is aesthetic heaven filled with bright colors and beautiful pictures.











- **Who are food influencers?**
- Food influencers are individuals who love to create digital content about various aspects of food, like sharing healthy recipes, reviewing restaurants, café, various food products etc. They have a very strong voice in their community, not only that through their content they build their own set of followers.

- *Food brands, restaurants, cafes and other food business owners love to work with food influencers to reach a more relevant audience and improve their brand reputation which is important to stand out in this growing competition.*













# Top Indian Food Bloggers and Influencers (2022)














Name	Followers	AVG. Engagement	Engagement Rate	Video Views	score	Con Det
 <b>Second Home</b> -  @SecondHome007	16.4m	229.3k	1.4%	0	9.24	Vie Con
 <b>Shipra Khanna</b> -  @ChefShipra	3.6m	57.6k	1.6%	464.7k	9.2	Vie Con
 <b>kabita's kitchen</b> -  @kabitaskitchen	864.7k	27.1k	3.14%	110.5k	8.74	Vie Con
 <b>Amar Sirohi</b> -  @foodie_incarnate	1.2m	21.6k	1.8%	3.3m	8.63	Vie Con
 <b>Aarti Madan</b> - 						






<https://qoruz.com/find-influencers/top-indian-food-bloggers-influencers>

Qoruz							
	<b>Aarti Madan</b> -  @AartiMadan	551.9k	14k	2.54%	123.9k	8.48	Vie Con
	<b>Govind</b> -  @keralafoodie	310.7k	13.7k	4.43%	111.6k	8.47	Vie Con
	<b>Vikas Khanna</b> -  @TheVikasKhanna	1.5m	13k	0.82%	843.7k	8.46	Vie Con
	<b>Ranveer Brar</b> -  @ranveerbrar	1.7m	12.3k	0.72%	203.3k	8.44	Vie Con
	<b>Pankaj Bhadouria</b> -  @BhadouriaPankaj	1m	11.9k	1.1%	106.7k	8.43	Vie Con













qoruz.com/find-influencers/top-indian-food-bloggers-influencers

Qoruz							
	<b>Shivesh</b> -  @bakewithshivesh	686.9k	11k	1.6%	103.7k	8.42	Vie Con
	<b>Kunal Kapur</b> -  @ChefKunalKapur	1.5m	8.8k	0.59%	48.1k	8.3	Vie Con
	<b>Saransh Goila</b> -  @SaranshGoila	560.5k	4.9k	0.89%	24.8k	7.95	Vie Con
	<b>Kamiya</b> -  @Kamiya	638.5k	3.4k	0.54%	29.9k	7.81	Vie Con
	<b>pooja dhingra</b> -  @poojadhingraa	7.1m	3.2k	0.05%	76.2k	7.8	Vie Con
	<b>Meghna's food</b>						








qoruz.com/find-influencers/top-indian-food-bloggers-influencers

Qoruz							
	<b>Meghna's food magic</b> -  @MeghnaFoodMagic	1.1m	3.1k	0.27%	297.7k	7.79	Vie Con
	<b>Sanjeev Kapoor</b> -  @SanjeevKapoor	1.2m	3k	0.24%	31.9k	7.78	Vie Con
	<b>Sarah Todd</b> -  @Sarah_Todd_	400.1k	2.6k	0.67%	14.5k	7.74	Vie Con
	<b>Pragya S</b> -  @thisisdelhi	246.3k	2.5k	1.03%	67.6k	7.73	Vie Con
	<b>Shivangi Arora</b> -  @twistie_bites	154.8k	2k	1.3%	0	7.68	Vie Con






WhatsApp  
LinkedIn  
Facebook  
Twitter  
Telegram






Activate Windows  
Go to Settings to activate Windows.

Qoruz							
	<b>MEHAK DHAWAN</b> - @foodiesince96	322.9k	1.9k	0.62%	28.6k	7.68	Vie Con
	<b>Neha Sharma</b> - @hungrydilliwaali	118.1k	1.2k	1.03%	65.9k	7.61	Vie Con
	<b>Tarla Dalal</b> - @Tarla_Dalal	590.1k	868	0.15%	18.1k	7.38	Vie Con
	<b>Masterchefmom</b> - @Masterchefmom	161.8k	774	0.48%	15.7k	7.23	Vie Con
	<b>chef Kelvin cheung</b> - @chefkelcheung	190.5k	611	0.32%	12.4k	6.97	Vie Con



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Qoruz							
	<b>Neha Sharma</b> - <a href="#">external link</a> @hungrydilliwaali	118.1k	1.2k	1.03%	65.9k	7.61	Vie Con
	<b>Tarla Dalal</b> - <a href="#">external link</a> @Tarla_Dalal	590.1k	868	0.15%	18.1k	7.38	Vie Con
	<b>Masterchefmom</b> - <a href="#">external link</a> @Masterchefmom	161.8k	774	0.48%	15.7k	7.23	Vie Con
	<b>chef Kelvin cheung</b> - <a href="#">external link</a> @chefkelcheung	190.5k	611	0.32%	12.4k	6.97	Vie Con
	<b>nishamadhulika</b> - <a href="#">external link</a> @nishamadhulika	277k	0	0%	91.8k	2.7	Vie Con



- [Shagun Segan](#) is a popular blogger that's established an impressive following with his stories and reviews about food, travel and more. He's the creator of Eat Trip Click and stands as one of India's top food influencers with his multi-channel platform that includes an extensive [website](#) plus 173k followers on [Instagram](#) and over 8k [Facebook](#) followers.







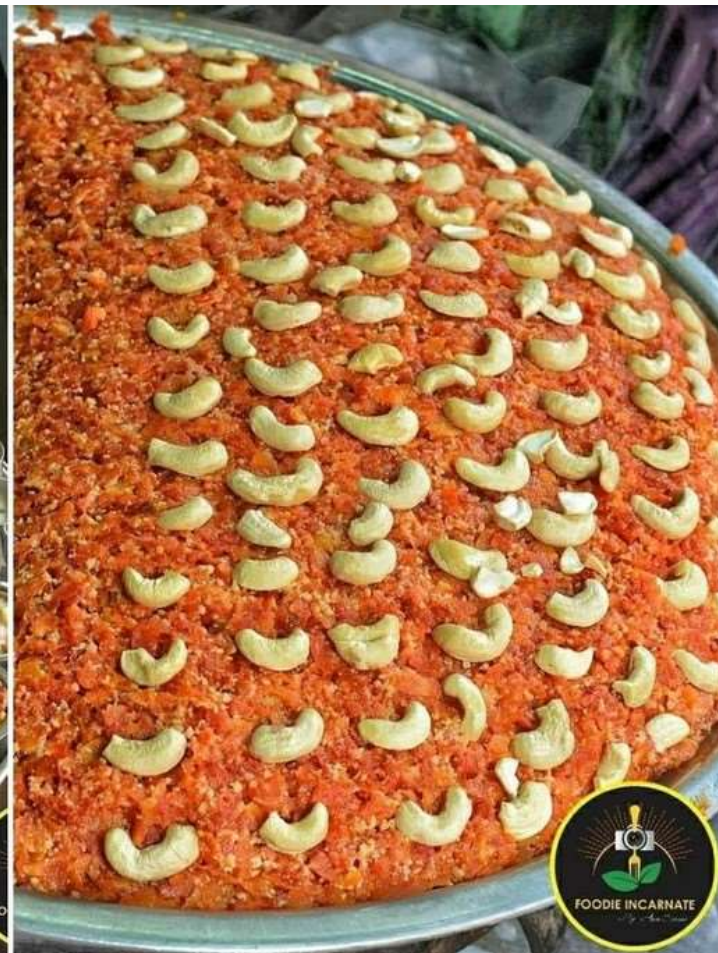
- Akshar pathak is many things — a comedian, graphic designer for Zomato, content creator and now one of the leading influencers in India known for his humorous posts. Food blogging is among his content offerings and anything endorsed by him gets a lot of exposure among his 553k followers on [Instagram](#) and over 23k followers on [Facebook](#).



- Indian celebrity chef, Sanjeev Kapoor, is well-respected as a top food KOL and expert that became famous as the host of a popular TV show called Khana Khazana. Sanjeev is now a successful YouTuber with a [YouTube](#) channel that boasts over 6 million subscribers.

- Amar Sirohi has been writing food and restaurant reviews for many years and reinvented himself as a major Indian food influencer and creator of Foodie Incarnate, India's largest vegetarian page. He recently celebrated hitting a 700k+ followers milestone on [Instagram](#).





- As winner of Masterchef India, Shipra Khanna has definitely established herself as an influential food KOL in India. Along with having 3.3M followers on [Instagram](#), Chef Shipra will also be starring in her own show, “Tadka Mar Ke” on Tata Sky.



- Radhi is a popular [Instagram](#) influencer with 1.4M followers. Her specialties include plant-based recipes, Ayurveda, healthy living and conscious cooking. She's married to Jay Shetty, former monk and purpose coach that became famous for hosting the podcast, "On Purpose," which received 64M downloads in its first year.





- Identified as @foodie\_actor\_engineer on [Instagram](#) with 253k followers, Rohan is a trained Computer Engineer that has expanded his talents into acting and content creation as a micro-influencer in Mumbai.



- Better known as Vegan Richa, Richa Hingle a food blogger, recipe master and author of best-selling Amazon book “Vegan Richa’s Indian Kitchen.” She has a large fan base of 327k on [Instagram](#) and YouTube channel with over 36k subscribers.







- Grandpa Kitchen does more than entertain its 9M+ [YouTube](#) channel subscribers with its food and cooking videos — they also do charitable work by donating all proceeds to people in need. They work with charities that provide food, clothing and supplies to orphans and low-income families.

- Deeba Rajpal, the mastermind behind “passionate about baking”, started as a food blogger back in 2007. She has since become one of India’s top food stylists, recipe creators and food influencers. She currently has 205k followers on her [Instagram](#) page plus another 74k+ followers on her second Instagram page @pabrecipes that includes all of her recipes.





- <https://digest.myhq.in/top-food-bloggers-in-india/>



# Social Data

- Social data is information that social media users publicly share, which includes metadata such as the user's location, language spoken, biographical data, and/or shared links.
- Social data is valuable to marketers looking for customer insights that may increase sales or, in the case of a political campaign, win votes.

- There are many types of social data, including tweets from Twitter, posts on Facebook, pins on Pinterest, posts on Tumblr, and check-ins on Foursquare and Yelp.
- Facebook for Business and Twitter Ads are two programs that help advertisers use social data to market to targeted users who are likely to be interested in their ads.



# Breaking Down Social Data

- Users voluntarily make much of their social data public, allowing companies free and easy access to it.
- If a company that sells tickets to athletic events sees that a user follows several sports teams, that company could target ads to that user to try to entice her to buy tickets to see her favorite team play.
- Another way a company can use social data is to provide timely ads based on recent posts, such as appliance ads for someone who has shared that they are shopping for a home.

- With high-quality social data that is aggregated and analyzed correctly, companies can target ads to the people who are most likely to buy their products or services.
- Social data can also help companies determine the most effective places to advertise. Companies can refine their advertising further by narrowing their target audience by gender, language spoken, electronic device used, age, interests, location, and other factors.
- Social data not only helps companies acquire new customers, but it also helps them further engage with existing customers.



# Analyzing Social Data

- There are normally two steps to analyzing social data. The first is collecting the data generated by users on networking sites and then to analyze that data.
- The process of analyzing typically takes place in real-time — and that is then used to determine influence, reach, relevance, and other considerations.
- Businesses that use this type of data analysis have to keep several things in mind, including how to distinguish between social data and sentiment, time relevance (what's relevant today may not be tomorrow), quality (how impactful certain messages and comments are by specific people), and how viral activity starts and spreads.



# Limitations of Social Data

- Social data is imperfect for several reasons. It is limited to the information that users decide to share about themselves.
- For example, some users may not share their location or their gender, giving advertisers an incomplete profile to work with. Another problem is that many users on social media are not real users but fake robot, or bot, accounts.
- Even with real users, attempting to gauge their feelings about a brand or political candidate (called “sentiment analysis”) based on the comments they make is not always possible because many of their comments are neutral and algorithms can incorrectly classify comments as positive when they are negative and vice versa.



# Analyzing Social Data

- Further, many positive and negative comments that are available are extremes, making it difficult to accurately evaluate how consumers overall feel about a product, service, brand, or political candidate.





# Planning a Social Network Analysis

## Step 1: Establish the network's basis for your research

- A bounded network is a network with a set number of network members (e.g., students in a classroom).
- An unbounded network is a network that does not have set membership (e.g., weekly meetup group with an open invitation to anyone in the community)



## Step 2: Develop and refine research questions

- Like other types of analysis, an SNA will be driven by your research questions; they will provide guiding direction, influence the data collection process, and shape your methods for data analysis.



## Step 3: Determine type of data to collect

- When collecting data on networks, it is also important to determine the type of connection data you want to collect.



## Step 4: Select data collecting tools

- The most common data collection methods used in SNA are surveys and interviews.



## Step 5: Select data collecting method/processes

- Full Network Method: Collecting data from every member of your network (or network subset that you are investigating). This method works with a bounded network. You may not be able to get everyone, but the more people you get, the more complete your understanding of the network will be.



# Snowball Method

- Starting with a core group of network members, you collect data on all of their connections.
- Then you reach out to the new connections and collect data on all of their connections. This continues until you cannot surface any more new members or until you run out of time.
- method will miss members who are not connected to the people sampled and may bias your sample; on the other hand, it may also help you access a wider sample of network members than you could have identified on your own.



## Step 6: Analyze the data

- Visual analysis, like mapping a social network, is usually used when conducting an SNA. Using your relational data, you can then begin to develop a network model.

- Networks are made up of nodes and paths. Nodes are the actors—individuals, groups, or things—that make up the network.
- 9 Paths are the lines (or edges) that connect the nodes together. 10 Paths can differ based on the kinds of interactions happening between nodes.



- One important characteristic of paths is directionality.
- Some networks are undirected, so a simple path (or line) exists between two nodes.
- Other networks are directed, so paths flow in a certain direction.
- In a directed graph, the paths are represented as a line with an arrow at one or both ends to indicate the direction of a connection (e.g., you follow someone on Twitter, but they don't follow you).

# A Taxonomy of Visualization

- A taxonomy of visualization in social media can be broadly categorized into structural, semantic, temporal, and statistical visualizations, each focusing on different aspects of social network data. These categories help analyze and understand the complex relationships and patterns within social media platforms.

- **Representations of Graph | Adjacency matrix | Incidence matrix | Adjacency list**
- [Sandeep Kumar Gour](#)
-

# Adjacency matrix





# Here are some of the ways to look at connections:

- Connectedness/Centrality: Number of connections one node has to other nodes
- Density: Number of connections divided by total possible connections
- Betweenness: Measures if a node stands between other nodes (bridging)
- Clique: A group of nodes where all possible links are present
- Component: A group of connected nodes

- Closeness: How close a node is to all other nodes (shorter path to other nodes increases closeness)
- Degree: Number of connections
- Measures of power: Being connected to connected nodes
  - Homophily: How similar or dissimilar network members are from their connections (demographics, education, occupation, etc.)

- Reciprocity: The level to which a connection is reciprocal
- Propinquity: Degree to which individuals have more ties with people geographically close to them



- In Web-based social networks (WBSNs), users state directly who they are friends with.
- Since collecting social network data in the real world is so difficult, WBSNs offer an attractive data alternative.
- They are dramatically larger than network models that are built by hand, and they are active and changing, rather than a fixed one-time view.

- There are hundreds of Web-based social networks. Some Web sites are dedicated specifically to social networking (*e.g.*, Facebook, Friendster, and MySpace), while others support social networks, but they are secondary to other features and purposes (*e.g.*, YouTube, Spout, and Tickle).
- Their purposes vary from religious to political to entertainment, and membership in a given network can be as small as a few dozen users to over 100,000,000.



# Web data

- Social data is information that social media users publicly share, which includes metadata such as the user's location, language spoken, biographical data, and/or shared links.
- Social data is valuable to marketers looking for customer insights that may increase sales or, in the case of a political campaign, win votes.
- There are many types of social data, including tweets from Twitter, posts on Facebook, pins on Pinterest, posts on Tumblr, and check-ins on Foursquare and Yelp. Facebook for Business and Twitter Ads are two programs that help advertisers use [social data to market](#) to [targeted users](#) who are likely to be interested in their ads.



# Breaking Down Social Data

- Users voluntarily make much of their social data public, allowing companies free and easy access to it.
- If a company that sells tickets to athletic events sees that a user follows several sports teams, that company could target ads to that user to try to entice her to buy tickets to see her favorite team play.
- Another way a company can use social data is to provide timely ads based on recent posts, such as appliance ads for someone who has shared that they are [shopping for a home](#).

- Companies can refine their advertising further by narrowing their target audience by gender, language spoken, electronic device used, age, interests, location, and other factors.
- Social data not only helps companies acquire new customers, but it also helps them further engage with existing customers.



# Analyzing Social Data

- There are normally two steps to analyzing social data.
- The first is collecting the data generated by users on networking sites and then to analyze that data.
- The process of analyzing typically takes place in real-time — and that is then used to determine influence, reach, relevance, and other considerations.
- Businesses that use this type of data analysis have to keep several things in mind, including how to distinguish between social data and sentiment, time relevance (what's relevant today may not be tomorrow), quality (how impactful certain messages and comments are by specific people), and how viral activity starts and spreads.



# Limitations of Social Data

- Social data is imperfect for several reasons. It is limited to the information that users decide to share about themselves. For example, some users may not share their location or their gender, giving advertisers an incomplete profile to work with.
- Another problem is that many users on [social media](#) are not real users but fake robot, or bot, accounts.
- Even with real users, attempting to gauge their feelings about a brand or political candidate (called “sentiment analysis”) based on the comments they make is not always possible because many of their comments are neutral and [algorithms](#) can incorrectly classify comments as positive when they are negative and vice versa.
- Further, many positive and negative comments that are available are extremes, making it difficult to accurately evaluate how consumers overall feel about a product, service, brand, or political candidate.  
<https://www.investopedia.com/terms/s/social-data.asp>



# Sources of RAW data

- Shares
- Likes
- Conversions
- Comments
- Mentions
- Impressions
- And most importantly, clicks – the click metadata is crucial for understanding more about what leads are interested in.





# social media data sources

- [Facebook](#)
- [Twitter](#)
- [TikTok](#)
- [Instagram](#)
- [LinkedIn](#)
- [Sina Weibo](#)
- [YouTube](#)
- [Reviews](#)
- [Blogs](#)
- [Brand logos](#)
- [Web metrics](#)



# Review sites

- Never underestimate the power of reviews. Nearly
- **91% of people think reviews are important enough to sway their purchasing decision.**
- **While 90% said user-generated content influenced their purchasing decision.**
- They're a powerful medium that can have a positive (or negative) impact on your potential clients, so they're essential to watch.

## Employee Review

[See All Reviews \(6040\)](#)

February 1, 2020



### "Senior Project Manager The Coca Cola Company"



Former Contractor - Computer Science Professor's Assistant in Atlanta, GA

I worked at The Coca-Cola Company for more than 3 years

#### Pros

Great people and office environment at the HOC

#### Cons

Constant rounds of downsizing left employees distracted and wondering when and where the hatchet was going to fall next

#### Advice to Management

Better communication



Helpful

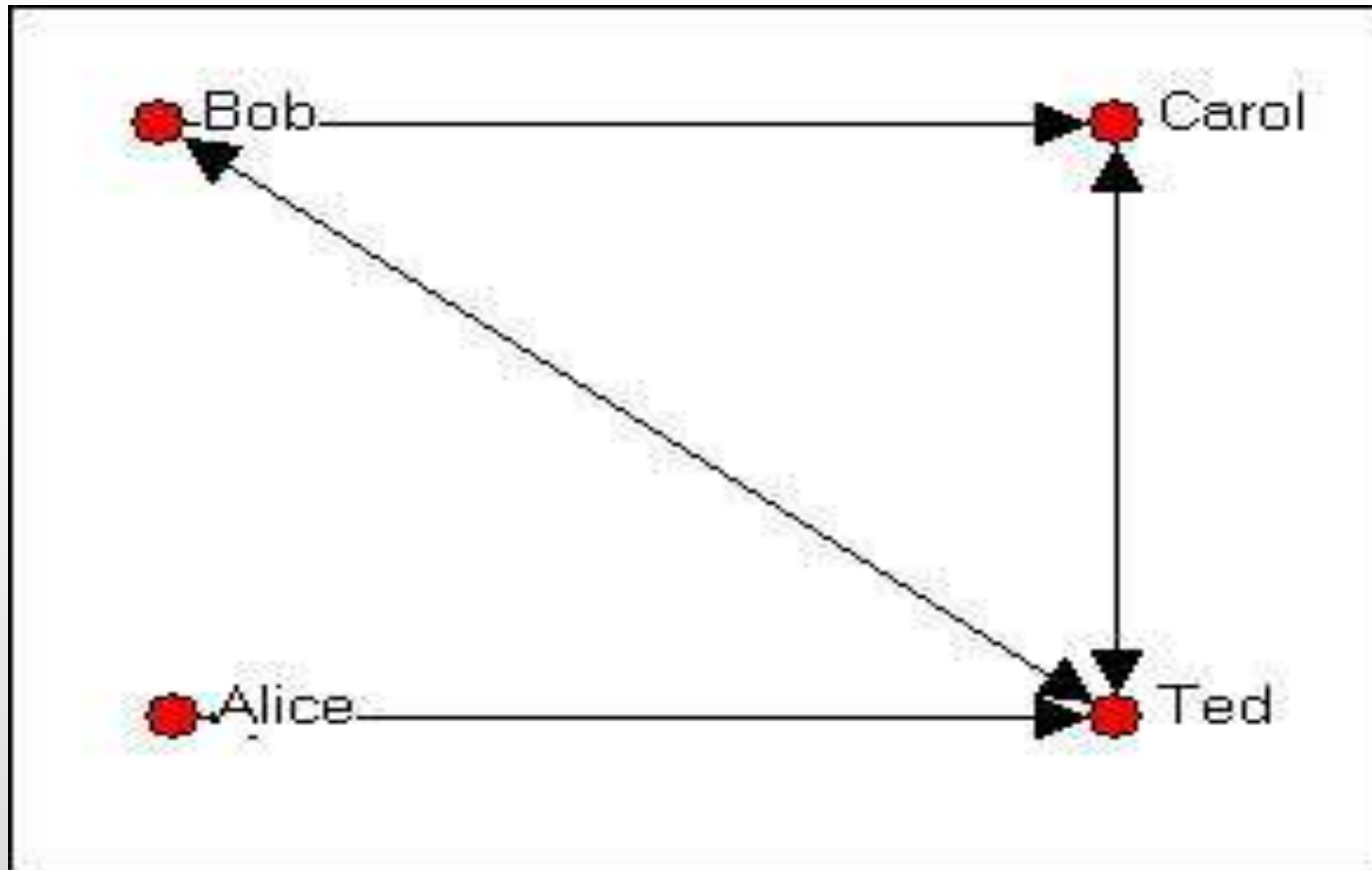


See reviews by: [Popularity](#) | [Rating](#) | [Date](#) | [All](#)



# Web metrics

- So far, we've looked at external data. What about internal? For effective monitoring, you should include metrics from your own website to see how your audience is growing, and whether your other social efforts impact it.



	<b>Bob</b>	<b>Carol</b>	<b>Ted</b>	<b>Alice</b>
<b>Bob</b>	---	1	1	0
<b>Carol</b>	0	---	1	0
<b>Ted</b>	1	1	---	1
<b>Alice</b>	0	0	1	---



# Graph

- Degree Centrality Degree centrality of a node is simply its degree - the number of edges it has.



# Closeness Centrality

- Closeness Centrality indicates how close a node is to all other nodes in the network. Calculated as the average of the shortest path length from the node to every other node in the network.



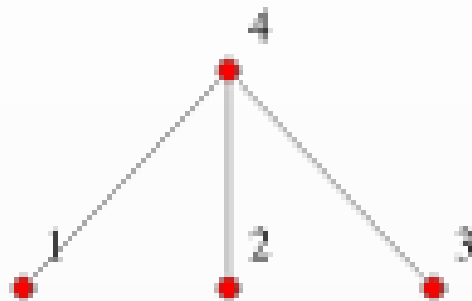


# Adjacency matrix

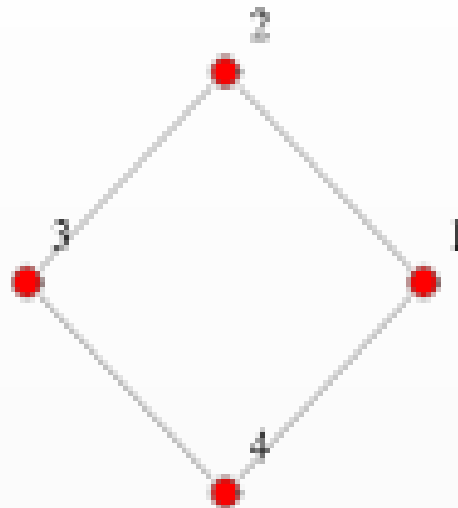
- The most common form of matrix in social network analysis is a very simple square matrix with as many rows and columns as there are actors in our data set.
- The "elements" or scores in the cells of the matrix record information about the ties between each pair of actors.



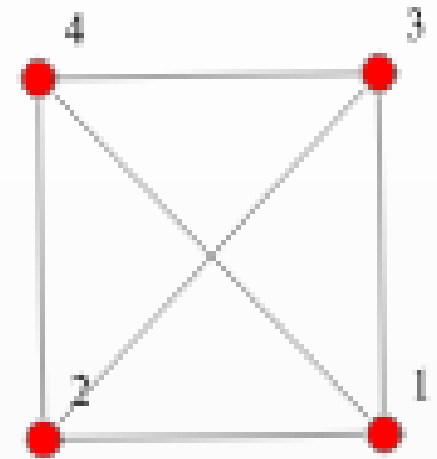
- The adjacency matrix, sometimes also called the connection matrix, of a simple labeled graph is a matrix with rows and columns labeled by graph vertices, with a 1 or 0 in position according to whether and are adjacent or not.
- For a simple graph with no self-loops, the adjacency matrix must have 0s on the diagonal. For an undirected graph, the adjacency matrix is symmetric.



$$\begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}$$



$$\begin{pmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{pmatrix}$$



$$\begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}$$



# Data mining in SM

- **Social media mining** is the process of obtaining big data from user-generated content on social media sites and mobile apps in order to extract patterns, form conclusions about users, and act upon the information, often for the purpose of advertising to users or conducting research.
- social media mining requires human data analysts and automated software programs to shift through massive amounts of raw social media data in order to discern patterns and trends relating to social media usage, online behaviors, sharing of content, connections between individuals, online buying behavior, and more.

- These patterns and trends are of interest to companies, governments and not-for-profit organizations, as these organizations can use these patterns and trends to design their strategies or introduce new programs, new products, processes or services.



- Third-party data-mining companies can also purchase or scrape data from numerous social media sites (Facebook, Twitter, Instagram, etc.) along with forums, blogs, news sites and other public pages where users leave comments or interact with specific social groups.
- The combined unstructured data — profiles, posts, images, connections — can then be used to identify behavioral patterns.
- Data miners sell datasets to companies, including airlines, hotels, retailers, manufacturers and political groups, that are looking to personalize customer experiences and improve service satisfaction.



# How Do Businesses Use Social Media Data?

## Advertising

- Targeted advertising on social media platforms is skyrocketing as companies figure out better ways to identify and address specific audiences.
- Advertising executives can also use data-mining techniques to determine which messages are most effective among certain demographic groups or the best time of day to run a specific ad on a specific digital platform.



# Influencer Marketing

- Social media data mining can be helpful in identifying influencers or users who have strong follower bases and engagement rates on certain social platforms.
- Businesses will use influencer marketing to help bring attention to products and services. An influencer may be a high-profile company executive, a celebrity, a blogger or an external product reviewer who can drive hits and clicks via a previously untapped sales channel.
- Careful analysis of social data can help companies to find the right influencer to promote their offerings.





# Market Research

- Companies use social media data mining to find out more about customer tastes, preferences and biases.
- For example, an organization may want to examine the demographic characteristics of emerging client groups or determine public sentiment toward a certain brand or logo — or even a politician or religious group.
- Companies also use social media data to gather intelligence on specific geographies, competitors or potential partners.



# Sales Enablement

- In addition to gathering information on proprietary products, a business may gather social intelligence on prospective customers' or partners' offerings to leverage in a sales pitch.
- A computer component manufacturer may investigate what complaints are surfacing on a PC manufacturer's goods, for instance, in hopes of helping the client to improve brand sentiment.



# Predictive Analytics

- Sophisticated algorithms and machine learning techniques can help with predictive modeling strategies, enabling companies to anticipate future customer trends.
- According to TechCrunch, social media analysis was a better predictor of the 2016 presidential election than traditional polls. Social media data is also helpful to the medical community when tracking and predicting the course of disease outbreaks.

[https://www.sandiego.edu/blogs/business/detail.php?\\_focus=76022](https://www.sandiego.edu/blogs/business/detail.php?_focus=76022)



# How Data Mining Works

- First, organizations collect data and load it into their data warehouses.
- Next, they store and manage the data, either on in-house servers or the cloud.
- Business analysts, management teams, and information technology professionals access the data and determine how they want to organize it.
- Then, application software sorts the data based on the user's results.
- Finally, the end-user presents the data in an easy-to-share format, such as a graph or table.



# Example of Data Mining

- Grocery stores are well-known users of data mining techniques. Many supermarkets offer free loyalty cards to customers that give them access to reduced prices not available to non-members.
- The cards make it easy for stores to track who is buying what, when they are buying it, and at what price. After analyzing the data, stores can then use this data to offer customers coupons targeted to their buying habits and decide when to put items on sale or when to sell them at full price.

- Some of the more commonly used social media data mining techniques include classification, association, tracking patterns, predictive analytics, keyword extraction, sentiment analysis, and market/trend analysis.



- Here are some examples of who and how social media data mining is used:
- • Some of its major uses in businesses include targeted marketing campaigns, market research, sales enablement, predictive analytics, influencer marketing, and monitoring of brand reputation.
- • Trend analysis - Businesses use social media data mining to gain valuable insights into currently trending keywords, mentions, and topics on social media platforms.



- • Event detection (social heat mapping) - This metric is of great importance for agencies and researchers who use social media monitoring.
- • Social spam detection - Social media data mining allows for easier detection of spammers and bots on social media platforms like Instagram and Twitter.
- • Ecommerce - Social media data mining is used to analyze how people talk about products.
- • Digital media - Social media data mining is also applied to the field of digital media. For example, the content that is to be shown on a particular digital billboard may be decided upon through conducting a social media data mining process in order to cater to the audience's preferences or needs.





- • Bloggers and social media influencers - Social media data mining is often used by bloggers and social media influencers to help them analyze the attitudes and feelings of their followers, what they are talking about, and how they feel about certain topics of discussion.
- • Brands - Social media data mining helps brands with important decision-making, for example, when deciding about potential future markets.

- Research purposes - Researchers find the use of social media data in their research a valuable asset to their work due to the magnitude and easy accessibility of the data. Social media data mining can be applied in different research domains, including social science, research, health research, and technology research. Some of its uses in the research field include gathering opinions, conducting research, recruiting study participants, undertaking participative 'citizen science', or fostering stakeholder involvement.

- • Government agencies - Social media data mining is also increasingly being used by government agencies for the purpose of welfare-focused interventions. One way social media data mining does this is by tracking residents' moves as they document their activities at tagged locations throughout the day. Clearly, social media mining can be a powerful tool that can help improve residents' lives and the safety of communities.

# How does the Greedy Algorithm works?

- **Greedy Algorithm** solve optimization problems by making the **best local choice** at each step in the hope of finding the global optimum. It's like taking the best option available at each moment, hoping it will lead to the best overall outcome.

# Here's how it works

- Start with the initial state of the problem. This is the starting point from where you begin making choices.
- Evaluate all possible choices you can make from the current state. Consider all the options available at that specific moment.
- Choose the option that seems best at that moment, regardless of future consequences. This is the "greedy" part - you take the best option available now, even if it might not be the best in the long run.
- Move to the new state based on your chosen option. This becomes your new starting point for the next iteration.
- Repeat steps 2-4 until you reach the goal state or no further progress is possible. Keep making the best local choices until you reach the end of the problem or get stuck.



- Let's say you have a set of coins with values  $[1, 2, 5, 10]$  and you need to give minimum number of coin to someone change for 39.
- The greedy algorithm for making change would work as follows:
- Step-1: Start with the largest coin value that is less than or equal to the amount to be changed. In this case, the largest coin less than or equal to 39 is 10.
- Step- 2: Subtract the largest coin value from the amount to be changed, and add the coin to the solution. In this case, subtracting 10 from 39 gives 29, and we add one 10-coin to the solution.
- Repeat steps 1 and 2 until the amount to be changed becomes 0.



- The greedy algorithm is not always the optimal solution for every optimization problem, as shown in the example below.
- When using the greedy approach to make change for the amount 20 with the coin denominations [18, 1, 10], the algorithm starts by selecting the largest coin value that is less than or equal to the target amount. In this case, the largest coin is 18, so the algorithm selects one 18 coin. After subtracting 18 from 20, the remaining amount is 2.
- At this point, the greedy algorithm chooses the next largest coin less than or equal to 2, which is 1. It then selects two 1 coins to make up the remaining amount. So, the greedy approach results in using one 18 coin and two 1 coins.
- However, the greedy approach fails to find the optimal solution in this case. Although it uses three coins, a better solution would have been to use two 10 coins, resulting in a total of only two coins ( $10 + 10 = 20$ ).

- 1. Identify the Problem and Candidate Set:
- The first step is to clearly define the problem and determine if it can be solved using a greedy approach.
- This involves identifying a set of possible choices or "candidates" at each step.

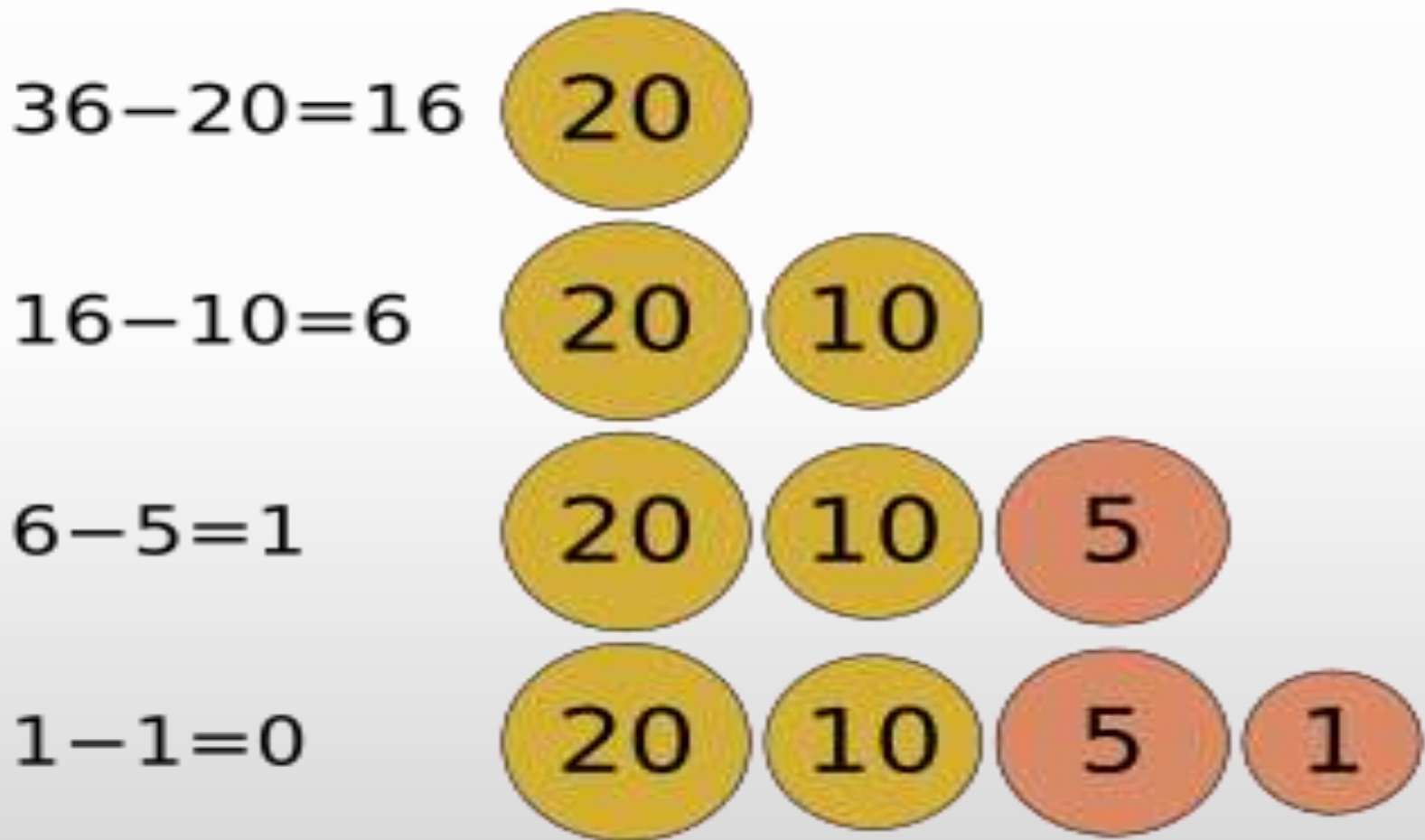


- 2. Greedy Choice Property:
- A crucial aspect of a greedy algorithm is the "greedy choice property." This means that the algorithm makes the choice that appears best at the current stage without considering future steps.
- For example, in a coin change problem, the greedy algorithm would always choose the largest possible coin denomination that is less than or equal to the remaining amount.

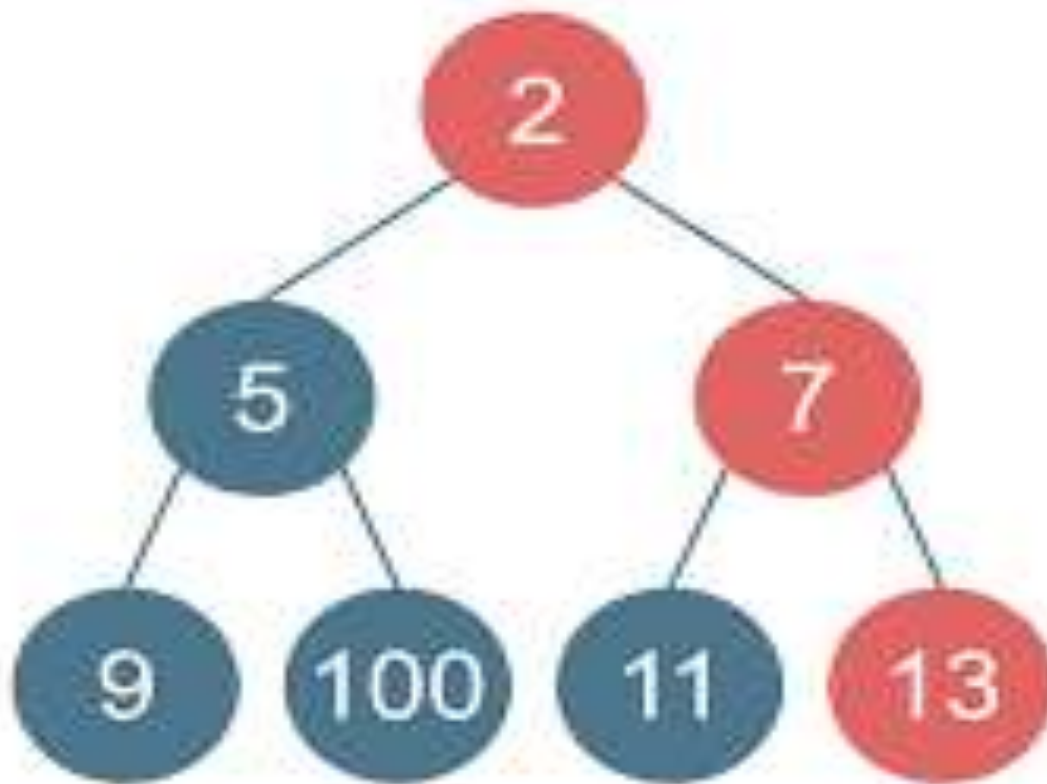
- 3. Optimal Substructure:
- Greedy algorithms work best when the problem exhibits "optimal substructure." This means that the optimal solution to the overall problem can be constructed from optimal solutions to its subproblems.

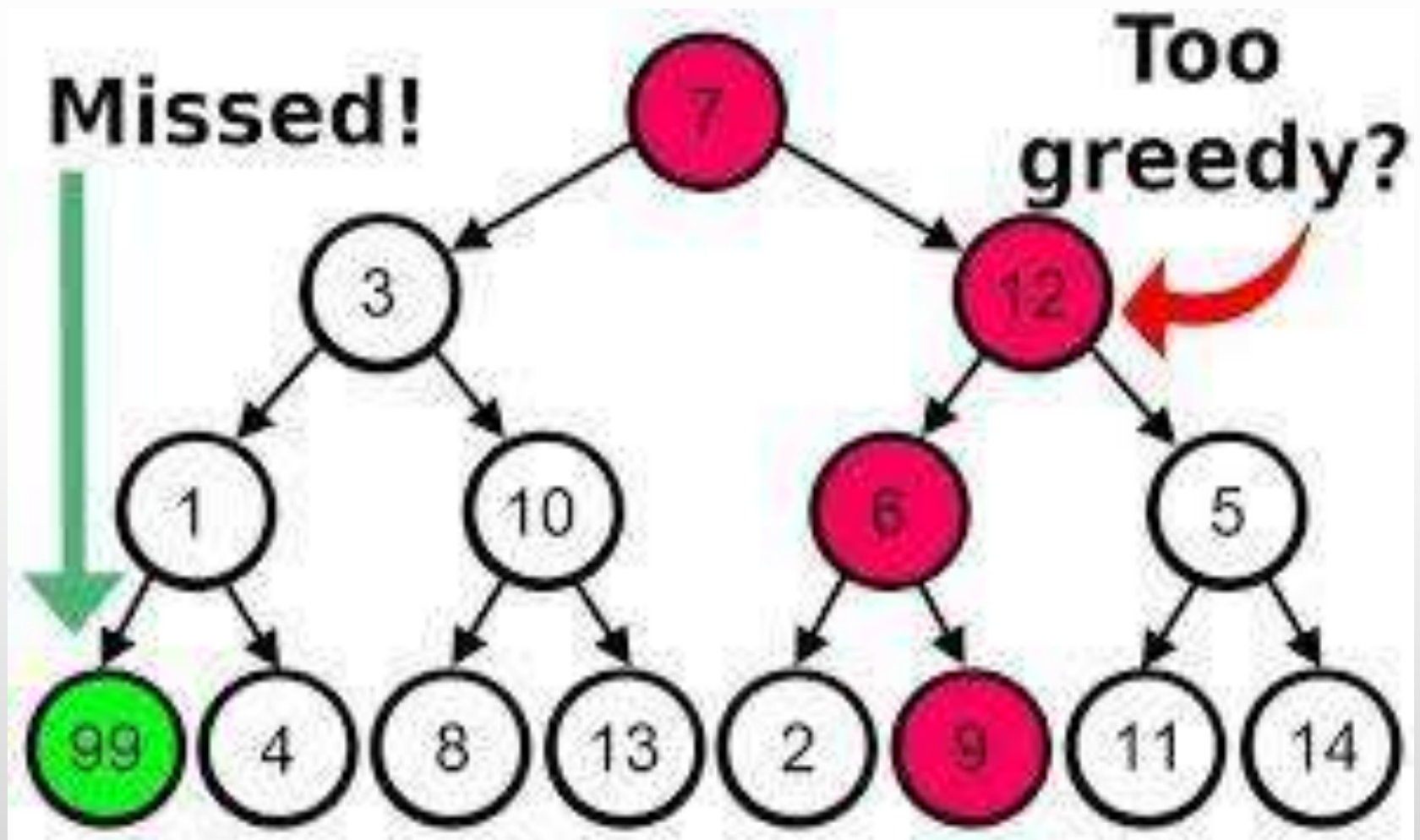
- 4. Iterative Process:
- The algorithm proceeds iteratively, making a greedy choice at each step and then reducing the problem to a smaller subproblem.
- This process repeats until the entire problem is solved.

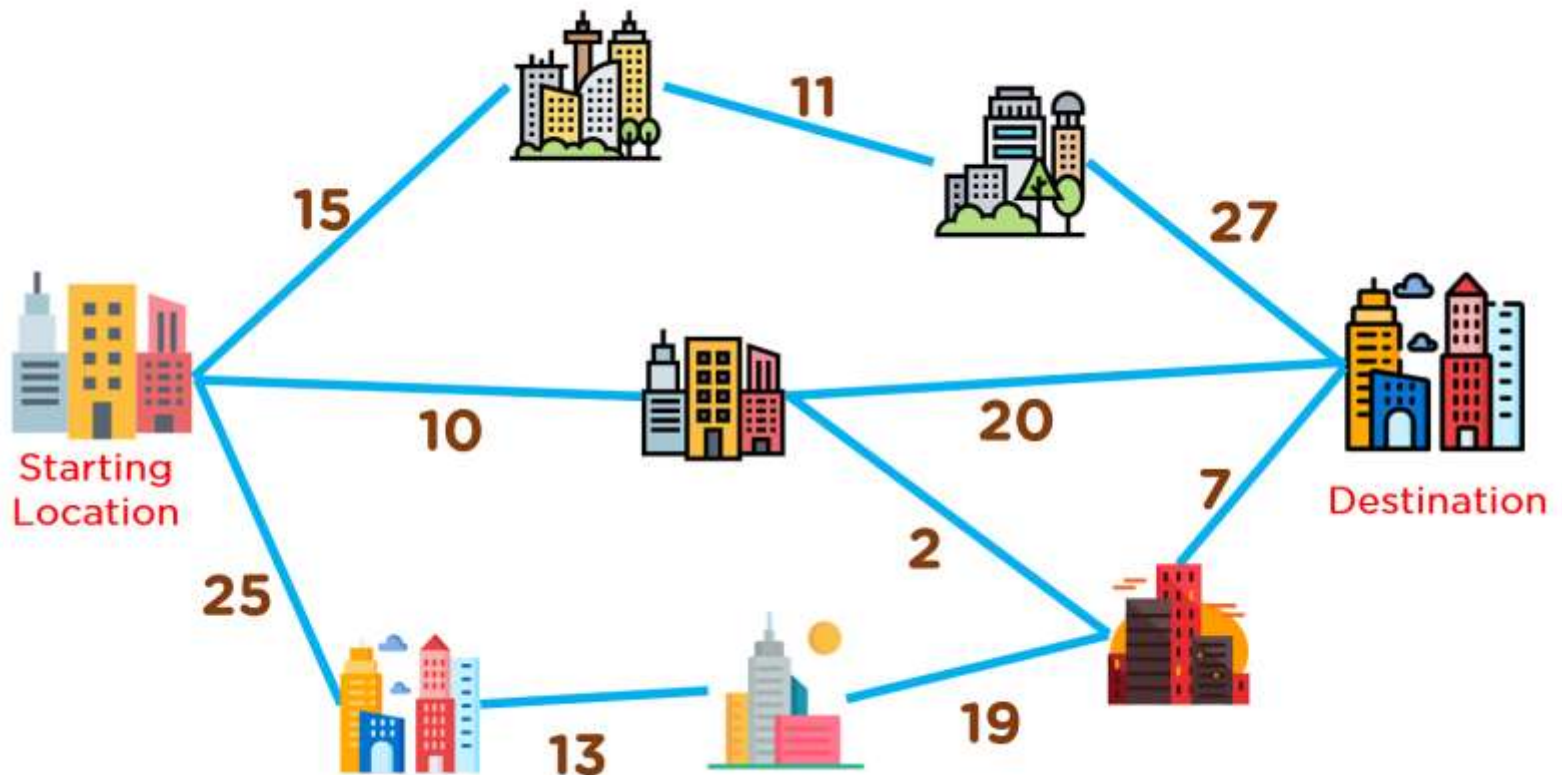
- 5. Combination of Solutions:
- The final solution is formed by combining the individual choices made at each step.



## Greedy Solution











# Hierarchical clustering

- Hierarchical clustering in social media analytics is a method used to group users or content into a tree-like structure based on their similarity, revealing hierarchical relationships within the data. This technique is valuable for identifying communities, understanding network structures, and discovering patterns in social media interactions.

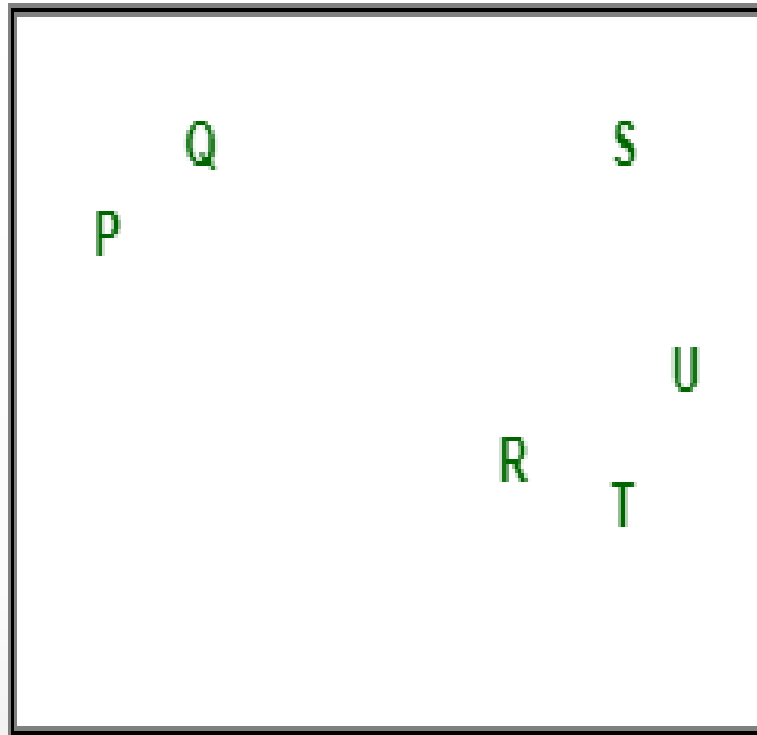
- Hierarchical clustering is used to group similar data points together based on their similarity creating a hierarchy or tree-like structure. The key idea is to begin with each data point as its own separate cluster and then progressively merge or split them based on their similarity.

- Imagine you have four fruits with different weights: an apple (100g), a banana (120g), a cherry (50g) and a grape (30g). Hierarchical clustering starts by treating each fruit as its own group.

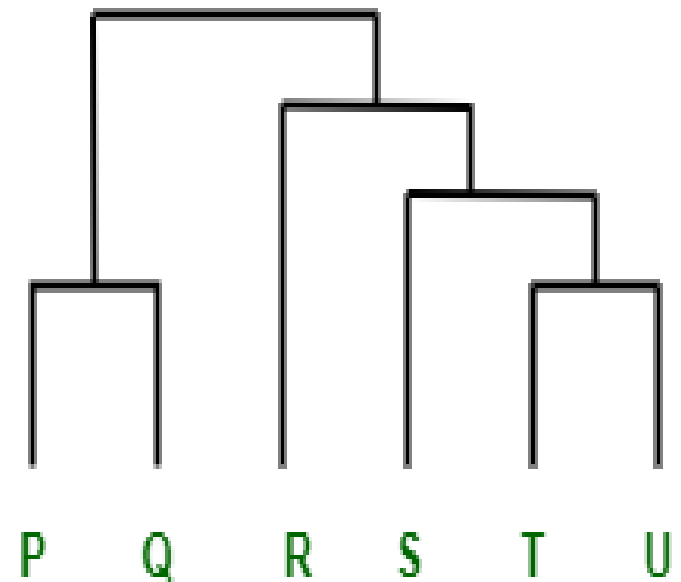
- It then merges the closest groups based on their weights.
- First the cherry and grape are grouped together because they are the lightest.
- Next the apple and banana are grouped together.

# Dendrogram

- A dendrogram is like a family tree for clusters. It shows how individual data points or groups of data merge together. The bottom shows each data point as its own group, and as you move up, similar groups are combined. The lower the merge point, the more similar the groups are. It helps you see how things are grouped step by step. The working of the dendrogram can be explained using the below diagram:



DENDROGRAM



- In the above image on the left side there are five points labeled P, Q, R, S and T. These represent individual data points that are being clustered. On the right side there's a dendrogram which show how these points are grouped together step by step.
- At the bottom of the dendrogram the points P, Q, R, S and T are all separate.
- As you move up, the closest points are merged into a single group.
- The lines connecting the points show how they are progressively merged based on similarity.
- The height at which they are connected shows how similar the points are to each other; the shorter the line the more similar they are



# Types of Hierarchical Clustering

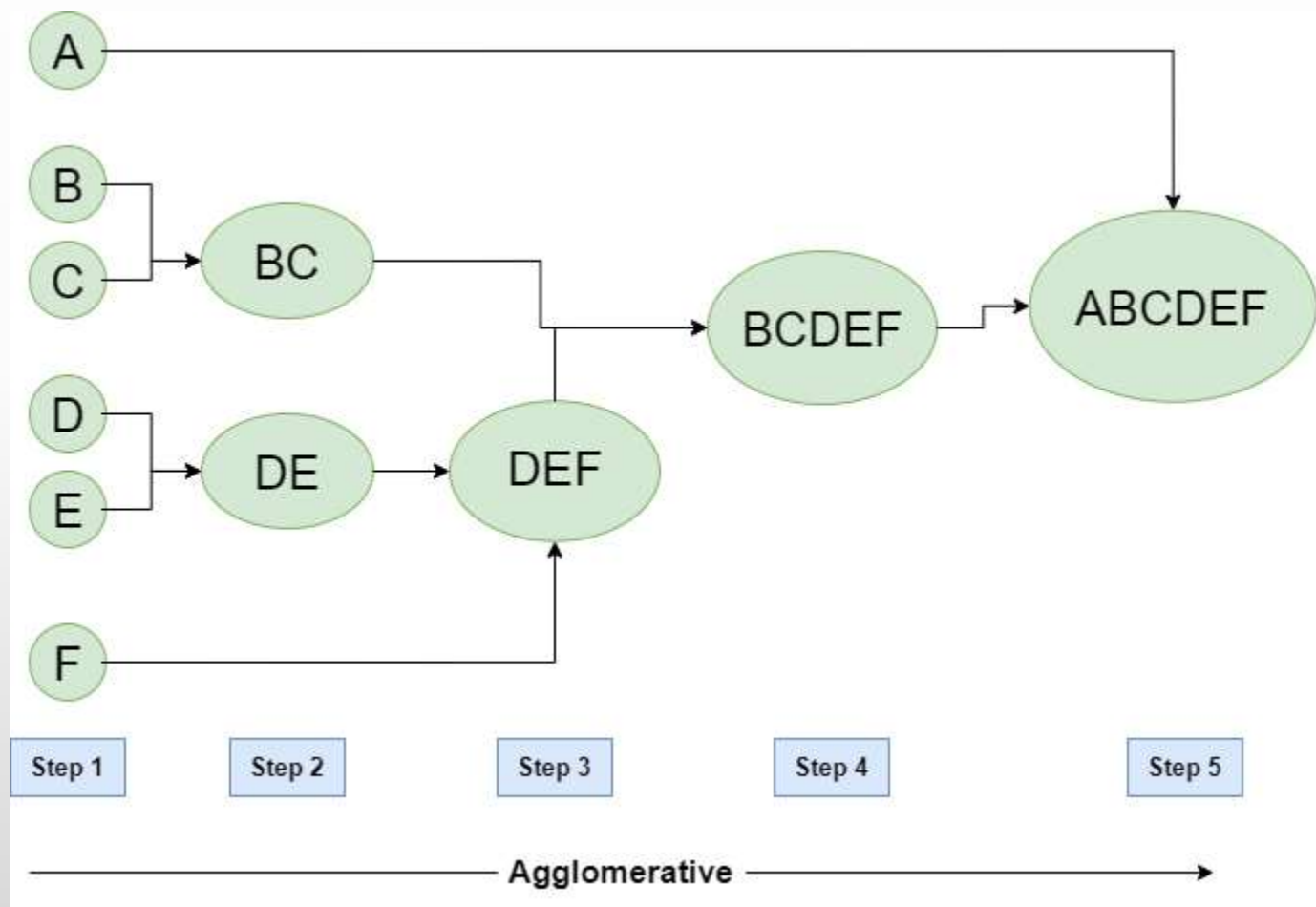
- Now we understand the basics of hierarchical clustering. There are two main types of hierarchical clustering.
- Agglomerative Clustering
- Divisive clustering





# Hierarchical Agglomerative Clustering

- It is also known as the bottom-up approach or hierarchical agglomerative clustering (HAC). Unlike flat clustering hierarchical clustering provides a structured way to group data. This clustering algorithm does not require us to prespecify the number of clusters. Bottom-up algorithms treat each data as a singleton cluster at the outset and then successively agglomerate pairs of clusters until all clusters have been merged into a single cluster that contains all data.





# Workflow for Hierarchical Agglomerative clustering

- Start with individual points: Each data point is its own cluster. For example if you have 5 data points you start with 5 clusters each containing just one data point.
- Calculate distances between clusters: Calculate the distance between every pair of clusters. Initially since each cluster has one point this is the distance between the two data points.
- Merge the closest clusters: Identify the two clusters with the smallest distance and merge them into a single cluster.

- Update distance matrix: After merging you now have one less cluster. Recalculate the distances between the new cluster and the remaining clusters.
- Repeat steps 3 and 4: Keep merging the closest clusters and updating the distance matrix until you have only one cluster left.
- Create a dendrogram: As the process continues you can visualize the merging of clusters using a tree-like diagram called a dendrogram. It shows the hierarchy of how clusters are merged.



# Hierarchical Divisive clustering

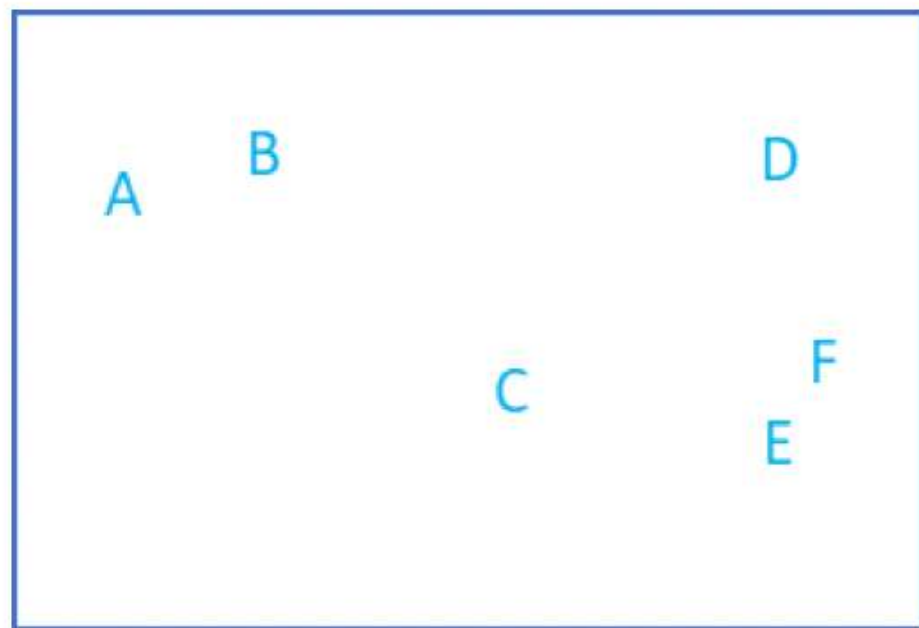
- It is also known as a top-down approach. This algorithm also does not require to prespecify the number of clusters. Top-down clustering requires a method for splitting a cluster that contains the whole data and proceeds by splitting clusters recursively until individual data have been split into singleton clusters.

Identify the two clusters that are **closest** together

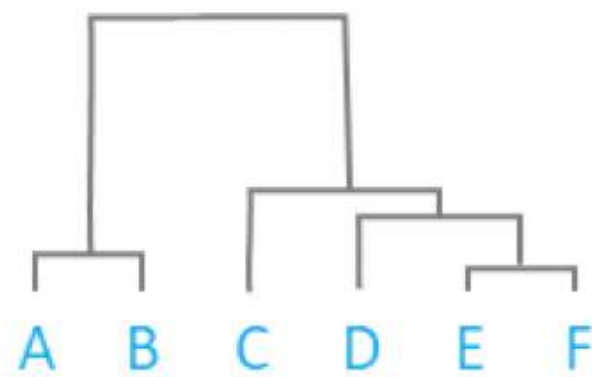


Merge the two most similar clusters



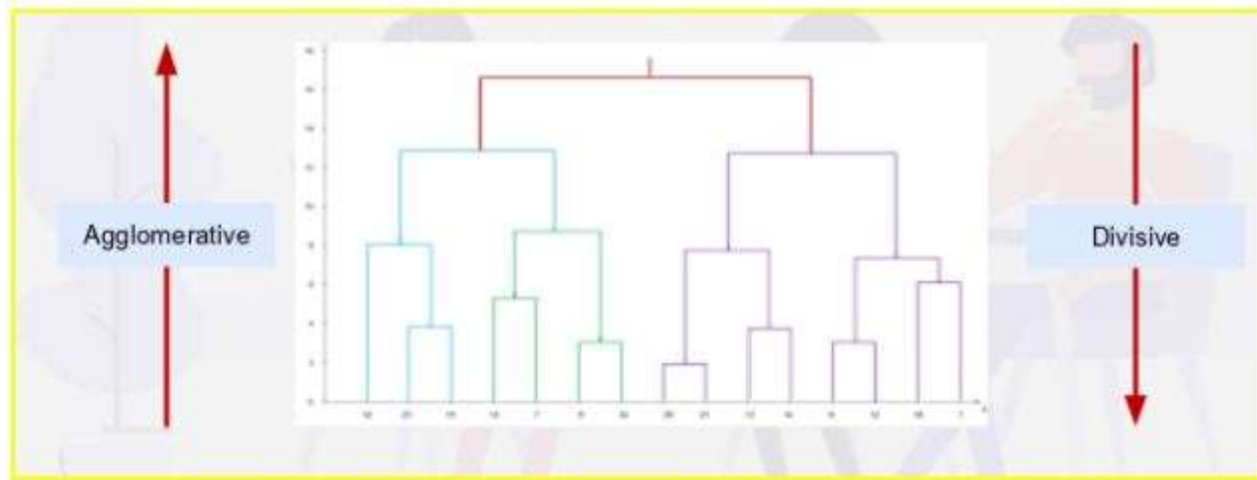


Dendrogram



# Divisive clustering

- Divisive clustering is known as the top-down approach. We take a large cluster and start dividing it into two, three, four, or more clusters.



<https://www.simplilearn.com/tutorials/data-science-tutorial/hierarchical-clustering-in-r>



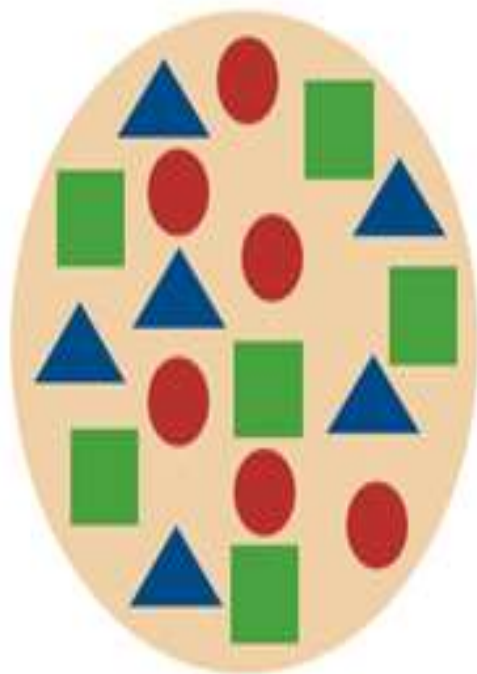
# K-means clustering

- K-means clustering is an unsupervised machine learning algorithm used to partition data points into distinct groups, or clusters, based on similarity. It aims to create clusters where data points within a cluster are more similar to each other than to those in other clusters.

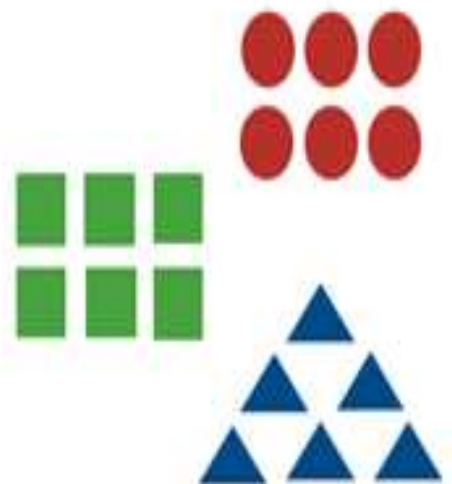
# K-Means Clustering

- Unsupervised Machine Learning algorithm.
- which groups unlabeled dataset into different clusters.
- It is used to organize data into groups based on their similarity.

- The unsupervised learning finds patterns, similarities, or groupings within the data to get insights and make data-driven decisions. It is particularly useful when dealing with large datasets where manual labeling would be impractical or costly.

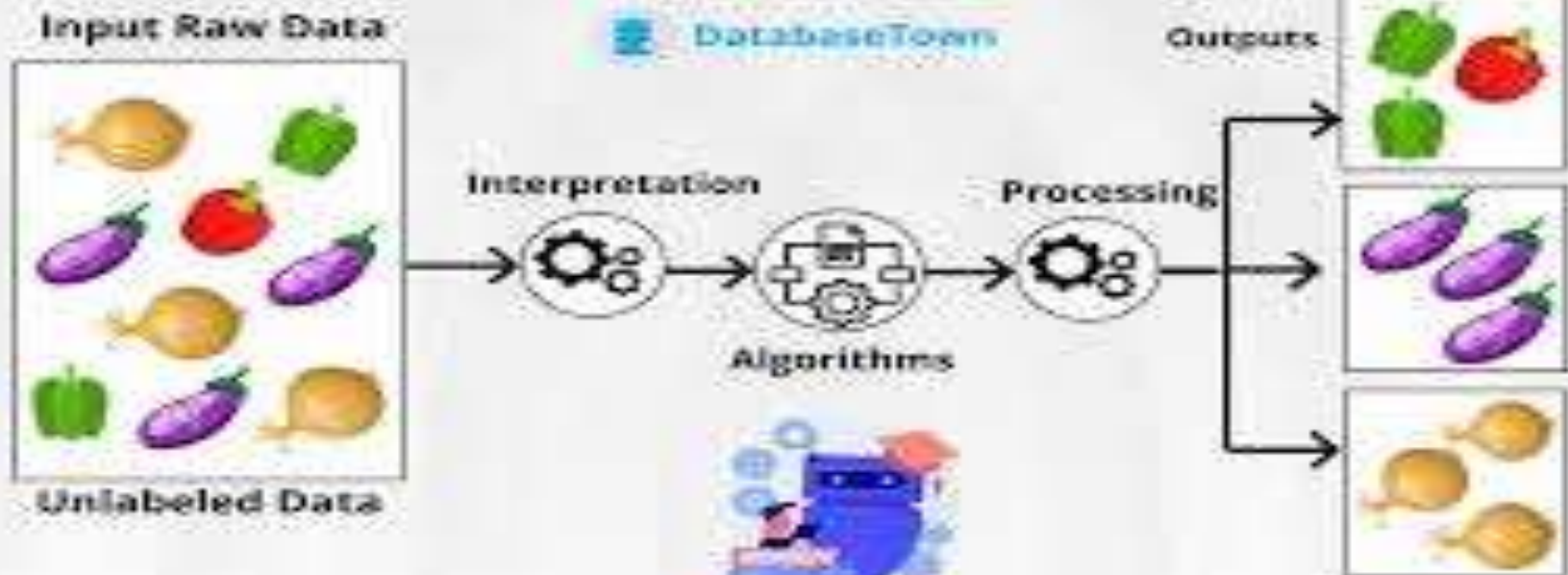


**Unlabeled  
Data**

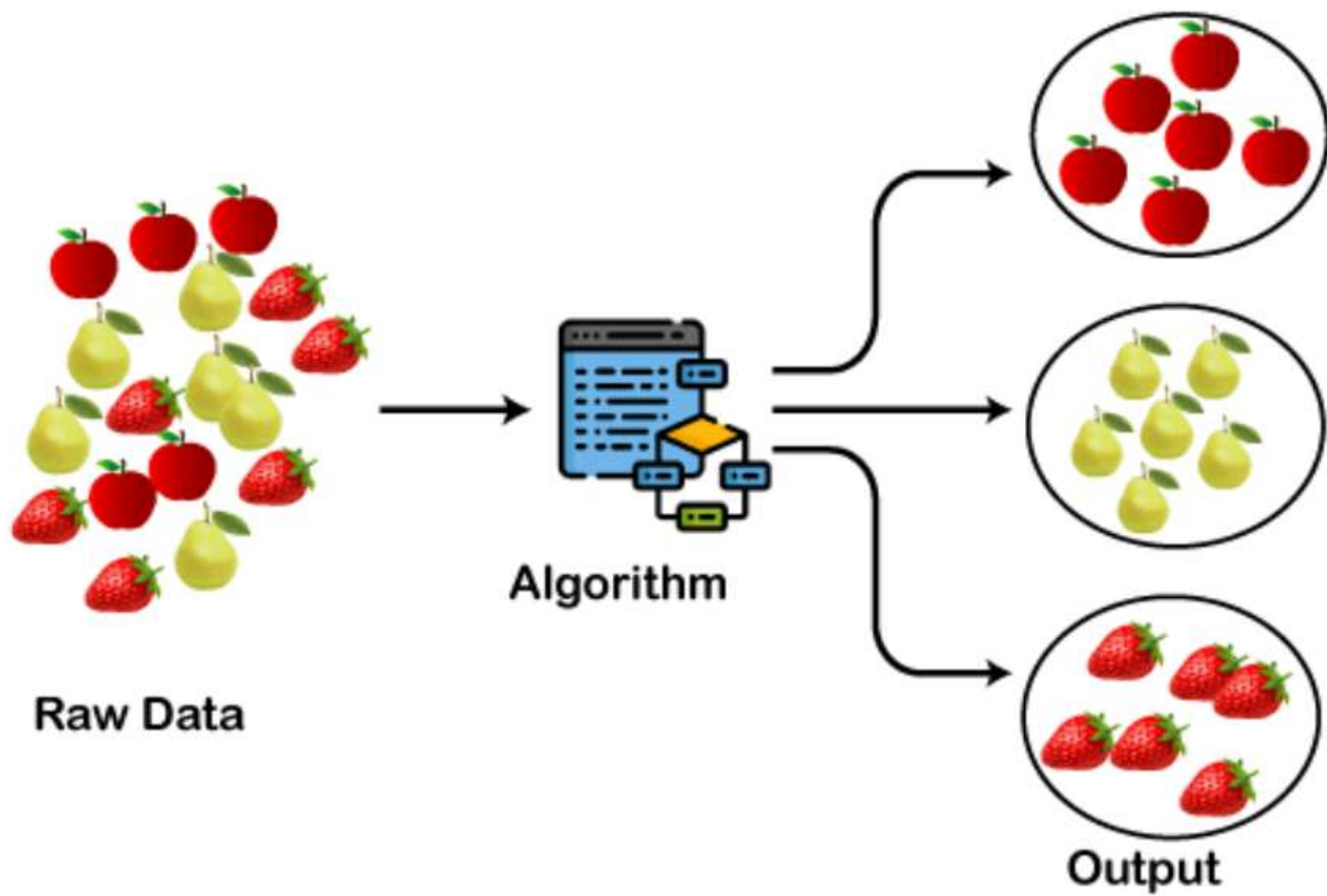


# UNSUPERVISED LEARNING

Unsupervised learning is a type of machine learning where the algorithm learns from unlabeled data without any predefined outputs or target variables.



<https://databasetown.com/unsupervised-learning-types-applications/>



# Applications of Unsupervised Learning

- Unsupervised learning finds applications across various domains. Some notable applications include:
- **Customer Segmentation:** Unsupervised learning algorithms can group customers based on their purchasing behavior, allowing businesses to tailor marketing strategies.
- **Anomaly Detection:** By identifying abnormal patterns or outliers, unsupervised learning can help detect fraud, network intrusions, or manufacturing defects.
- **Image and Text Clustering:** Unsupervised learning can automatically group similar images or texts, aiding in tasks like image organization, document clustering, or content recommendation.
- **Genome Analysis:** Unsupervised learning algorithms can analyze genetic data to identify patterns and relationships, leading to insights in personalized medicine and genetic research.
- **Social Network Analysis:** Unsupervised learning can be used to identify communities or influential individuals within social networks, enabling targeted marketing or detecting online communities.

# How k-means clustering works?

- We are given a data set of items with certain features and values for these features like a vector. The task is to categorize those items into groups. To achieve this we will use the K-means algorithm. 'K' in the name of the algorithm represents the number of groups/clusters we want to classify our items into.









