



University of Ottawa/Université d'Ottawa

**Faculty of Engineering School of Electrical Engineering
and Computer Science**

Assignment 1

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Course - *CSI5101 Knowledge Representation*

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Exploration 2 - Psychology

Q1 – AI and Perception (5 points)

The company BrainChip aims at making sensors process all five senses (visual, hearing, touch, smell, and taste).

Read this blog: <https://brainchip.com/real-world-ai-processing-all-five-senses/>

TODO: Summarize their goal, technology and the type of applications they envisage for each sense.

Goal:

Offer sensory modalities that mimic the senses and offer benefits in both new and current Applications.

The company aims to build an Intelligent system which can process and analyze data from multiple sensory inputs including visual, auditory, olfactory, gustatory and somatosensory information. These kinds of systems can perform real-time analysis of data from surroundings and can make decisions based on sensory data collected.

Technology:

The BrainChip has developed a neuromorphic computing platform called Akida, implementing AI solutions to provide highly efficient and low-power AI Processing capabilities for edge devices. The platform is based on a unique neural network architecture called Spiking Neural Networks (SNNs), which are inspired by the structure and function of the human brain.

Akida is an ideal smart camera system which is used in remote areas or areas where high-speed connectivity and power are unreliable. It performs object recognition within the camera itself without connecting with its back-end database for processing. It does learning and processing in the camera itself. This camera can be continuously trained to identify new images without heavy resource consumption. These cameras are incorporated with smart microphones, which are trained to identify the sounds using acoustic monitoring. It monitors noise and listens for the sound that indicates the problem. Akida can trigger action on the basis of what it hears.

An olfactory analysis is a massive breakthrough, Akida - equipped with sensors performs accurate detection of more than 100 chemical compounds. Taste-sensing AI Devices with Akida can learn and re-learn continuously when new information is detected. The ability to perceive temperature, wetness, pressure, texture and other sensations may significantly enhance how machines interact with their environment and provide more effective and efficient systems in almost any setting.

Types of Applications:

Visual:

Drones with smart visual sensors can perform safety inspections and identify threats. It can be efficiently used in defence(to monitor intrusion or patrolling), agriculture(to monitor crop growth), etc.

Audio:

Voice and image sensors can be combined as voice and gesture recognition to navigate and perform new tasks and assist people with disabilities to access the world in novel and better ways.

Olfactory:

Breath sensor data is used to identify medical conditions such as Parkinson's, different kinds of cancer, kidney diseases, etc.

Taste/Gustatory:

The food business may employ technology to enhance and automate the food supply chain from processing and production through distribution and retailing, as well as to ensure food safety and freshness.

Touch:

Human-Machine interfaces and prosthetic devices can assist people with disabilities. Touch is used by Akida processors to do vibrational analyses of the integrity of infrastructure, such as bridges and highways, and spot possible issues as they age.

Q2 – Cognitive Processes (3 points)

Situation = A friend asking for help to solve a programming problem (choose the one you like)

TODO: Fill out the table

Cognitive Process	Examples
Perception	A friend calling
Attention	Responding to the friend
Language	A friend explaining the programming problem
Memory	You acknowledging the problem, correlating it with problems solved in past
Learning	Finding the solution to solve the programming problem
Background Knowledge	Programming experience, Known programming Language/ concept
Thinking Process	Logical explanation to solution/Solution

Q3 – Humour (2 points)

Let's investigate humour a bit more and how much it relies on background knowledge.

TODO:

- Find 2 jokes that you think are interesting in this [Source](#)
- For each joke, explain the background knowledge necessary to understand it (and find it funny or not!). Express your opinion as to which group (which population) would possess such background knowledge.

A woman in labor suddenly shouted, “Shouldn’t! Wouldn’t! Couldn’t! Didn’t! Can’t!”

“Don’t worry,” said the Doc. Those are just contractions.”

Figure 1: [Source](#)

The joke in Figure 1 is about a woman in labour who is shouting words such as "Shouldn't! Wouldn't! Couldn't! Didn't! Can't!", these are examples of contraction words, which are words that are formed by combining two words and omitting some letters.

The doctor's response, "Don't worry, those are just contractions", is a play on words. The doctor is explaining that the woman's shouts are actually contractions, a term that has a double meaning in the context of labour. In labour, contractions are the regular tightening and relaxing of the uterus that helps to push the baby out, while in language, contractions are shortened forms of words.

The joke is humorous because it takes something as serious and intense as labour and adds a lighthearted twist by making a play on words.

To understand this joke one would need background knowledge of Labour and Delivery, Uterus Contractions and contraction words. This background knowledge is generally common among people who have a basic understanding of pregnancy and childbirth, as well

as language and linguistic concepts, for example, Medical Professionals, women who have gone through labour, and anyone who has taken a course in language or linguistics.



Figure 2: [Source](#)

Claustrophobia is a medical condition where a person has an extreme or irrational fear of closed or small enclosed spaces. The joke in figure 2 is about a claustrophobic person who is also an astronaut. This joke is a pun on the profession of astronauts who are trained to travel in space and spend much of their time in small space. The punchline "He just needed a little space" is a play on words, using the phrase "little space" in a double meaning, referring both to physical space and the need for a break or moment of solitude.

To understand this joke one would need background knowledge about claustrophobia and astronauts and their work. Having this background knowledge will help the reader understand the contrast between the profession of an astronaut, who spends much of their time in enclosed spaces, and the condition of claustrophobia, which is a fear of small or enclosed spaces.

This background knowledge is common among people who have a general understanding of phobias and space exploration.

Q4 – Bloom's taxonomy (3 points)

In this blog, entitled [The importance of Building Critical Thinking Skills](#), there is a link to Bloom's taxonomy.

TODO:

- **Read the blog and summarize its main ideas.**

Due to the rise in technology and automation, it is significantly important to prepare students to meet the rising demands of the business. A vital part of this process is developing critical thinking skills. Bloom's taxonomy categorizes the stepping stones of the development of reasoning and thinking skills. Critical thinking is a broad term representing higher-level thinking which can be skill-oriented, person-oriented and social norms.

In the modern world of business, the skill-oriented approach is more suitable and it is essential to nurture critical thinking in the early academic stages as it requires consistency to improve thinking habits. Satya Nadela mentioned in an interview about Microsoft's transition from a "know-it-all-mindset" to a "learn-it-all" attitude while reevaluating the business model and adapting to the changing demands. Thus as a student, it is of utmost importance to be a strong critical thinker to be able to secure a job. This can help them to find previously unaccounted information through the course of action led by their curiosity.

The top 3 skills employers look for in students are communication skills, problem-solving skills and teamwork skills. In spite of that, there is a skill gap in business education to certain constraints and thus rote learning practices like MCQs, quizzes and exams. The skill gap continues to widen as traditional teaching paradigms are long-established while business challenges become more complex.

- **Do you agree with what the blog says?**

I agree with what the blog says. Rote learning gives more emphasis on memorizing the repeating information over and over until it is committed to memory. This type of learning in the traditional education system can help students memorize facts, formulas and concepts but limited understanding of the implementation of knowledge in real-world situations. The business requirements are changing and companies are looking for people who can solve problems and make decisions based on their understanding, analytical and critical thinking skills.

- **The blog focuses on undergraduate business students, but do you think it also applies to computer science or engineering students? If yes, why and how? If not, why not?**

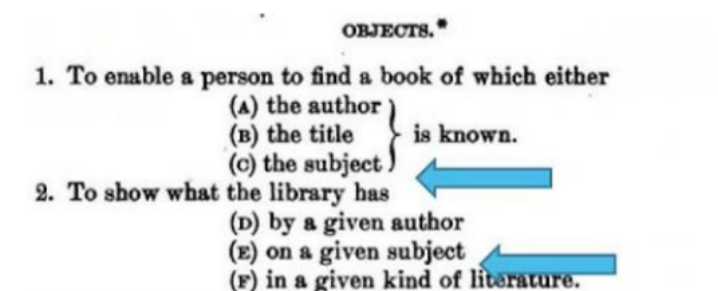
The problem of rote learning limiting critical thinking skills is not limited to computer science or computer engineering students but it is prominently pronounced in these fields. These fields are multidisciplinary fields that demand individuals with analytical, strong problem-solving and decision-making skills. Lack of skills can result in computer science and engineering graduates having a limited understanding of the concepts and theories they

have studied, making it difficult for them to apply their knowledge to real-world situations. This can be a disadvantage for these graduates, as well as for the companies that hire them.

Exploration 3 – Library Science

Q5 – Book/Movie retrieval (5 points)

Analyze a site that you like for buying books, or analyze a movie streaming site (changing a book for a movie) with respect to how much the site allows you to perform the following types of retrievals intended by the LCSH.



TODO:

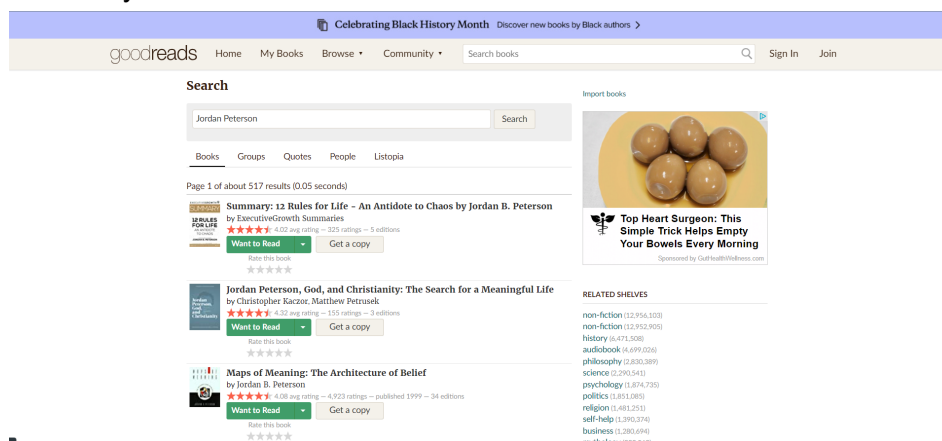
- Generate at least six queries that you will try (state them) to simulate the objectives of LCSH.

The prime aim of the LCSH system is to provide an authoritative way of organizing information which facilitates efficient and faster retrieval of relevant information.

The site that we have used for this question is https://www.goodreads.com/?ref=nav_home

We performed the following queries:

Search by Author Name: “*Jordan Peterson*”



Search by Book Title: “12 Rules of Life”

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12 Rules for Life: Ordnung und Struktur in einer chaotischen Welt

Jordan B. Peterson, Marcus Ingendaay (Translator), Michael Müller (Translator)

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Wie können wir in der modernen Welt überleben? Jordan B. Peterson beantwortet diese Frage humorvoll, überraschend und informativ. Er erklärt, warum wir Kinder beim Skateboarden alleine lassen sollten, welches grausame Schicksal diejenigen ereilt, die alles allzu schnell kritisieren und warum wir Katzen, die wir auf der Straße antreffen, immer streicheln sollten. Doch was bitte erklärt uns das Nervensystem eines Hummers über unsere Erfolgchancen im Leben? Und warum beteten die alten Ägypter die Fähigkeit zu genauer Beobachtung als höchste Gottheit an? Dr. Peterson

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I HAD MY PATIENCE TESTED
I'M NEGATIVE

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Search By Release Date: **16 January 2018**

The screenshot shows the Goodreads website with a search bar at the top. The search results are filtered by the release date 'January 16, 2018'. The results page shows 'Page 1 of about 14 results (0.05 seconds)'. The first three results are:

- Pattern Recognition Applications and Methods: 7th International Conference, ICPRAM 2018, Funchal, Madeira, Portugal, January 16-18, 2018, Revised Selected Papers** by unknown author. 0 ratings, 1 edition. Buttons: 'Want to Read', 'Get a copy'.
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- Accident & Incident Log Book: Accident & Incident Record Log Book, Note Journal 122 pages Paperback - January 16, 2018** by Jason Solt. 0 ratings, 2 editions. Buttons: 'Want to Read', 'Get a copy'.

On the right side of the page, there is a featured image of a person in a yoga pose with the text 'Chiropractors Baffled: "30 Second" Stretch Relieves Years Of Back Pain (Watch)' and a link to '101LifeHacks.com'.

Search by book's award details: **"National Book Award"**

The screenshot shows the Goodreads website with a search bar at the top. The search results are filtered by the award detail 'National Book Award'. The results page shows 'Page 1 of about 99 results (0.06 seconds)'. The first three results are:

- Winner of the National Book Award** by Jincy Willett. 3.35 avg rating, 2,165 ratings, published 2000, 17 editions. Buttons: 'Want to Read', 'Get a copy'.
- Building Bridges Stephen King Live at the National Book Award** by Stephen King (Goodreads Author). 4.30 avg rating, 157 ratings, published 2004, 4 editions. Buttons: 'Want to Read', 'Get a copy'.
- The Book That Changed My Life: Interviews with National Book Award Winners and Finalists** by Neil Baldwin (Editor), Diane Olsen (Editor). 3.22 avg rating, 79 ratings, published 2002, 4 editions. Buttons: 'Want to Read', 'Get a copy'.

On the right side of the page, there is a featured image of several brown eggs with the text 'Top Heart Surgeon: This Simple Trick Helps Empty Your Bowels Every Morning' and a link to 'GutHealthWellness.com'. Below this, there is a 'RELATED SHELVES' section with a list of book categories and their counts: fiction (22,077,988), non-fiction (12,952,969), non-fiction (12,952,388), contemporary (7,039,193), audiobook (5,699,934), adult (4,215,148), novels (2,633,581), book-club (2,566,925), humor (2,119,349), adult-fiction (1,939,437), literary-fiction (1,235,236), comedy (754,993), and essays (729,334).

- **Describe the results obtained.**

When we compare the results obtained by the search queries we can clearly see that the results generated with title, author and ISBN number are more precise than the search results obtained with the release date, book award details and Genre. If an individual is looking for a specific book then one should go with filters like title, author or ISBN number, but if looking for a book similar to a specific book, one can go with filters like the genre or national book award. When the search was performed with the release date then the results were quite ambiguous, we got the research papers from conferences held around the date.

- **Mention how satisfying those results are to you.**

Results generated with the filters book title, author and ISBN number were satisfactory but when we used the filters genre, date or awards, the results were quite ambiguous and difficult to find a specific book.

- **Provide a few suggestions for improvements to the site/application tested.**

To improve the site/application, a developer can add multiple filter conditions to improve the search results. For instance, I want a book by author Jordan Peterson with self-help and philosophy as genres. Moreover, the search can be improved if user reviews or synonyms in the title can be incorporated in the search backend logic.

Exploration 4 – Knowledge Management

Q6 – DIKW (3 points)

In DIKW, a situation can be analyzed in terms of Data perceived, Information constructed, Knowledge acquired from contextualizing the information and Wisdom of what to do (how to react).

TODO: Describe the process of going to the grocery store and buying what you need for your dinner, providing examples for each step (Data, Information, Knowledge, Wisdom).

DIKW pyramid is a model that represents the relationship between data, information, knowledge, and wisdom. It stands for:

Data: raw, unprocessed facts and figures

Information: data that has been organized and given meaning

Knowledge: information that has been understood and applied to a specific context

Wisdom: the ability to make good decisions based on knowledge and experience

The process of going to the grocery store and buying what you need for dinner can be represented using the DIKW pyramid as follows:

Data:

- List of ingredients for dinner recipe (e.g. chicken, tomatoes, onions, spices, etc)
- Store Location
- Store hours
- product prices

Information:

- Online research on product prices and brands(eg. Walmart's website)
- Making a mental note of which items are on sale or which brands to buy
- Organizing the data into a list of items to purchase at the store (e.g. 1 kg of chicken, 2 pounds of potatoes, 1 onion)

Knowledge:

- Recognizing mode of transport to go to store based on its proximity from current location
- Recognizing the best time to go to the store to avoid long lines and crowded aisles (e.g. early morning or late at night)
- Understanding which aisle in the store the items can be found in (e.g. chicken in the meat department, potatoes and onions in the produce section, etc)

Wisdom:

- Deciding to purchase the items with offers to save money
- Deciding to purchase generic or store-brand items instead of name brands to save money
- Choosing to buy fresh ingredients instead of canned or frozen options to ensure the highest quality dinner

Q7 – Tacit/Explicit Knowledge (2 points)

Provided your undergraduate studies, what you learned can be split into tacit knowledge and explicit knowledge.

TODO: Provide examples of each type of knowledge.

Explicit knowledge refers to knowledge that is easy to articulate and codify in written or oral form, such as theories, formulas, algorithms, procedures, rules, and best practices.

Examples of explicit knowledge in undergraduate studies could include

- Mathematical concepts and equations
- Books and research papers
- Historical facts and events
- Data structures and algorithms
- Computer networking protocols
- Software engineering principles
- Scientific laws and principles
- Programming languages and code
- Literature and writing styles
- Web Development principles
- Software Development

Tacit knowledge, on the other hand, refers to knowledge that is difficult to articulate or express in a straightforward manner and is often based on experience, intuition, and personal skills.

Examples of tacit knowledge in undergraduate studies could include

- Problem-solving skills and critical thinking abilities
- Designing skills
- Communication and interpersonal skills
- Leadership and teamwork abilities
- Creativity and innovation skills
- Emotional intelligence and empathy.

Exploration 5 – Computer Science

Q8 – Heuristics (4 points)

There are situations in life in which we prefer to use heuristic knowledge taught to us then go the full try/error empirical way (gathering positive and negative examples and learning from them).

For example, as a student, you could experiment and see what leads to failing and succeeding in exams over the years, but that takes a while and the consequences are not great. Instead, you might want to use heuristic knowledge.

TODO:

- **Describe 4 heuristics you use in order to succeed in an exam (perhaps these heuristics were gathered through your years as a student. You can express these heuristics as rules, or just describe them in sentence**

1. **Prioritize your time and focus on the most important topics.**
The important practice when studying for exams is to plan time and prioritize the topics based on difficulty level and its importance in exams. It is important to give enough time to study and self-reflection. Identify the weak areas and work on them. It's important to develop effective study habits, such as setting aside dedicated time for studying, creating a comfortable study environment, and breaking down your studying into manageable chunks
2. **Actively engage with study material and concepts taught in exams.**
Instead of passively reading the material, try to actively engage through outlining, summarising, and making quick notes to revise.
3. **Consistently practice and revise.**
When some concept is learnt and understood, try to revise them regularly. Actively elaborate on the material you're studying, by connecting it to your own experiences, creating visual aids, or summarizing the information in your own words. This can help you better understand and retain the information.
4. **Collaborating with classmates or a study group can be an effective way to reinforce your understanding of the material and fill in any gaps in your knowledge.**
Additionally, discussing the material with others can help you to identify different perspectives and approaches to the material.

Q9 – Knowledge types (3 points)

We saw 5 types of knowledge: declarative, procedural, structural, heuristic, meta. All these types of knowledge would be present in a situation like drive a car, or riding a bicycle.

TODO:

- **Provide examples of each type of the 5 types of knowledge for either one of the situations mentioned (driving or biking)**

Declarative knowledge - Declarative knowledge consists of facts about people, places, things, and events that can be made verbally. While driving a car, there are certain examples of declarative knowledge :-

1. Stop signs, red lights, speed restrictions, and other traffic regulations and signals.
2. Procedure to check tyre pressure, check oil levels, and execute other basic maintenance procedures.
3. The position of break and accelerator in the car.

Procedural knowledge - The knowledge used to carry out a task is known as procedural knowledge, often referred to as knowing-how and practical knowledge. While driving a car, there are certain examples that reflect procedural knowledge :-

1. In order to start the car, you must turn the key, adjust the seat and the mirrors, and buckle your seatbelt.
2. To ensure optimal engine performance, one must shift from drive to reverse or from one gear to another.
3. Checking blind spots: Looking back to ensure merging, changing lanes, or making a turn is safe.

Structural knowledge - Structured knowledge is explicit knowledge that may be found in formal papers and regulations that organisations have developed through observing experts and their decision-making techniques. While driving a car, there are certain examples that reflect structural knowledge :-

1. Engine operation - recognising how the engine transforms fuel into power to drive the vehicle.
2. Braking system - recognising how the vehicle is slowed down and stopped by the brakes by exerting pressure on the wheels.
3. Fuel system - Knowing how the vehicle's engine receives fuel and how that fuel is stored, pumped, and supplied.

Heuristic knowledge - Heuristic knowledge commonly includes the rules and procedures of guessing and judgement in a field. It is less rigorous and more judgemental knowledge of the performance. While driving a car, there are certain examples that reflect heuristic knowledge :-

1. Predicting when a driver in front of you is likely to change lanes, make a turn, or stop is known as anticipating other drivers' actions.
2. Calculating the distance between your car and other roadside objects, such as other cars or pedestrians
3. Figuring out what speed is appropriate for various road circumstances, such as rain, snow, or heavy traffic.

Meta knowledge - Knowledge about knowledge is known as metaknowledge. Meta knowledge includes knowing what other people know, what information they need,

and how to use their own knowledge appropriately. While driving a car, there are certain examples that reflect meta knowledge :-

1. Knowing your personal driving skills and weaknesses, as well as the impact that distractions, stress, and your attitude can have on your performance.
2. Modifying your driving technique to account for alterations in the road environment, such as bad weather or heavy traffic.
3. Allowing yourself the time to consider your driving experiences and pinpoint opportunities for development.

Exploration 6 – Symbolic AI

Q10 – Definitions (5 points)

We talked of definitions found in a dictionary as intentional definitions. In an intentional definition, we most likely see a word defined through a genus and differentia. Those are two other terms we talked about. In this question, we want to compare various definitions of the same word from different dictionaries.

TODO:

- **Choose a word X that would have at least 2 meanings. We call that a polysemous word.**

The term "polysemous word" refers to a word with several, connected meanings. As a result, the listener or reader may interpret the term in a different way than the speaker or writer meant, which can cause ambiguity or misunderstandings in communication.

For the assignment we chose our word X to be "Rock".

- **For each meaning, find 3 definitions coming from different dictionaries.**

"Rock" can have multiple meanings. Rock may refer to a particular movement, a type of music and a mineral.

Rock - "Movement"

Merriam Webster - to move back and forth in or as if in a cradle

Oxford Dictionary - move backwards and forwards

Cambridge Dictionary - to (cause someone or something to) move backwards and forwards or from side to side in a regular way

Rock - "A type of music"

Merriam Webster - popular music usually played on electronically amplified instruments and characterized by a persistent heavily accented beat, repetition of simple phrases, and often country, folk, and blues elements

Oxford Dictionary - a type of loud popular music, developed in the 1960s, with a strong beat played on electric guitars and drums

Cambridge Dictionary - a type of popular music with a strong beat, which is usually played with electric guitars and drums.

Rock - "A type of mineral"

Merriam Webster - a concreted mass of stony material

Oxford Dictionary - the hard solid material that forms part of the surface of the earth and some other planets

Cambridge Dictionary - the dry solid part of the earth's surface, or any large piece of this that sticks up out of the ground or the sea

- **Build a comparative table in which you show for each meaning what is being suggested as genus and differentia in each dictionary.**

	Merriam Webster Dictionary	Oxford Dictionary	Cambridge Dictionary
A type of movement	Genus - Swinging Differentia - Repetitive movement	Genus - Swinging Differentia - Repetitive movement	Genus - Swinging Differentia - Type of movement
A type of music	Genus - Rock and roll Differentia - Persistent heavily accented beat	Genus - Heavy music Differentia - Loud sound	Genus - Rock and roll Differentia - Strong beat
A type of mineral	Genus - Mineral Differentia - stony material	Genus - Mineral Differentia - surface material	Genus - Landform Differentia - land formation

- **Cite your sources (which dictionary did you use?)**

Merriam Webster Dictionary - <https://www.merriam-webster.com/>

Oxford Dictionary - <https://www.oxfordlearnersdictionaries.com/definition/english/>

Cambridge Dictionary - <https://dictionary.cambridge.org/dictionary/english/>

- **In a few sentences, analyze the information that you put in your comparative table. What do you think? Do you prefer some definitions over others? Why?**

After analysing genus and differentia for different meanings of a word in various dictionaries, we can clearly see that definitions for the same meaning are portrayed and described differently.

For example, while defining rock as a mineral, Merriam Webster dictionary defines it as just a mass of stony material whereas Cambridge Dictionary relates the rock to be a part of the Earth's surface on the land or sea. I prefer the definition given by the

Cambridge dictionary as it clarifies and stresses on the fact that a rock is a part of Earth's land, maybe broken in fragments.

While defining rock as a movement, Merriam Webster dictionary and the Oxford dictionary define rock as a movement back and forth, whereas in Cambridge it is defined as both back and forth and sideways. The definitions in the Cambridge dictionary are comparatively more elaborate and self explanatory.

Q11 – Frames (5 points)

Frames can be defined for anything. Imagine describing an office room which contains a desk, a lamp, a computer and a chair.

TODO:

- **Develop the 5 frames (with their frame elements) to correspond to the five words: office room, desk, lamp, computer, chair**

Office Room - Office room frame may consist of desk, lamp, chair, pen stand, lighting, speakers, laptop, keyboard, projector, blackboard.

Desk - Desk frame may include the physical characteristics of the desk such as material and color, laptop, pen stand, keyboard, lamp

Lamp - Lamp frame may include physical characteristics of the lamp such as intensity of light and color of the lamp.

Computer - Computer frame may include computer screen , speakers, keyboard, physical characteristics of the computer such as screen width, color of the computer body.

Chair - Chair frame may include characteristics of chair such as material, wood quality, color and strength.

- **For each frame, include at least 3 descriptive slots (features), one genus slot (superclass), and one procedural slot (e.g. used to). For each descriptive slot, provide the range (e.g. integer, enumeration).**

Office room frame

Descriptive slots

Dimensions (integer)

Furnishing (enumeration)

Lightning (enumeration)

Ventilation (enumeration)

Paint colour (enumeration)

Genus slot

Room (superclass)

Procedural slot

- Used to perform official tasks and meet deadlines.
- Used to schedule in person or online important meetings.

Desk frame

Descriptive slots

Material (enumeration)

Shape (enumeration)

Size (integer)

Colour (enumeration)

Drawers (integer)

Genus slot

Furniture (superclass)

Procedural slot

- Used to perform tasks and provide support
- Used as storage and support for various things such as lamp and laptop.

Lamp frame

Descriptive slots

Light source (enumeration)

Brightness (integer)

Shape (enumeration)

Colour (enumeration)

Intensity (integer)

Genus slot

Lightning (superclass)

Procedural slot

- Used to provide lightning to the room
- Used to serve decorative purposes

Computer frame

Descriptive slots

Type (enumeration)

Processor (enumeration)

Storage (integer)

Chip (enumeration)

Operating System (enumeration)

Genus slot

Electronic (superclass)

Procedural slot

- Used to perform computational tasks
- Used to store data such as games and movies
- Used to surf internet

Chair frame

Descriptive slots

Material (enumeration)

Comfort (enumeration)

Style (enumeration)

Color (enumeration)

Shape (enumeration)

Genus slot

Furniture (superclass)

Procedural slot

- Used to provide comfortable seating.
- Used for casual as well as gaming purposes

Exploration 7 – Information Retrieval

Q12 – Folksonomy (5 points)

This [Source](#) gives a list of movie categories for Netflix.

TODO:

- **Although these categories might have been given by people working at Netflix (and not a community), explain why these categories look more like a folksonomy than a taxonomy.**

Taxonomy sorts data in a systematic and hierarchical manner based on the shared qualities of the information. The person who creates or owns the content adds them. The idea is to organise the process of categorising information so that it can be easily accessed. They are commonly implemented to arrange web pages or content repositories. Folksonomy is based on tags that users, not the content's creators, contribute to the content. In other words, the tags are added by the "people." This method doesn't classify stuff according to a predetermined hierarchy. Instead, using any terms they like, customers apply their labels to the information they deem relevant for sorting. The given source provides us with a list of movie categories. The list resembles folksonomy more than taxonomy due to the following reasons: -

1 - The category list uses collaborative tagging. We are no longer bound to the physical constraint of the movie, but we are organising it based on metadata, which is information about information. For example, a movie Anime Action is listed under the Anime category but might also be added to the action category. Hence there is no systematic or hierarchical categorisation as in taxonomy based on a single feature.

2 - Sociologist Goffman came up with the “labelling theory” which states that in taxonomy when a person or thing is labelled some way by society, it begins to take on the characteristics of that label, even if the label is false. It gives the power of categorisation to the institutions creating them. But in case of the provided movie categorisation, the titles and the classification may change depending on the tags and reviews provided by the viewers. A single movie may lie in multiple categories which reflects properties of folksonomy.

- **Give 2 examples of movies that could be assigned 3 different tags.**

1- Kung Fu Hustle - The movie Kung Fu Hustle is an action movie based on sport Kung Fu. The movie can lie in multiple categories depending on how viewers tag it. The possible tags can be “Action & Adventure, Foreign Thriller, Sports”.

2 - Spider-Man: Into the spider verse - The spider man movie is an Action-comedy movie and is also enjoyed more by the children in their teen age. Viewers while watching the movie can tag it using different tags such as “Action & Adventure, Comedy, Children & Family movies”.

- **Since there are no explicit relation between tags, it is possible that a movie gets assigned 2 tags contradicting each other. But that would not be detected. Give an example of 2 contradictory tags. Explain why you consider these tags contradictory.**

Yes, the scenario where 2 tags can be contradicting each other is possible. There can be a movie tagged as both Sci - Fi and Historic genre. The two given tags are contradictory to each other. In an ideal scenario Sci - Fi means science fiction deals with imaginative and futuristic concepts involving modern science and technology whereas a historical movie genre shares past events and is set up in historic times. Both the movie tags describe the movie to belong in two different time zones which is practically not possible. Hence the tags Sci - Fi and Historic are contradictory.

Exploration 8 – Data-driven AI

Q13 – Data labelling (5 points) As mentioned in class, there are many data labelling services.

TODO:

- **Further explore 4 services of your choice and compare them. Include at least one that is crowdsourcing.**

Sources:-

1-https://www.v7labs.com/?utm_campaign=V7%20Brand%20Campaign&utm_source=ppc&utm_medium=CPC&gclid=CjwKCAiAioifBhAXEiwApzCztr0lc31LNhSa8EF0Es_gicH88NKC7dno9msFHutbb-VJ40_xqRr45FRoC_DEQAvD_BwE

2-<https://dataloop.ai/solutions/data-annotation/>

3-<https://www.mturk.com/help>

The process of annotating and categorising data for various machine learning and artificial intelligence applications is known as "data labelling services." Data labelling aims to produce labelled data that may be used to train models to carry out particular tasks, such sentiment analysis or object detection. In order to provide the services, human annotators can manually label the data or label it in bulk using software. There are many data labelling services, to name a few: -

1. Appen (Figure Eight) - In order to annotate and categorise data for various machine learning and artificial intelligence applications, Appen provides data labelling services. The company provides users with a platform to annotate text, audio, video, and image material, which can then be used to train machine learning models. For applications including object detection, image classification, sentiment analysis, and speech recognition, Appen's data labelling services can be employed.

The data labelling services offered by Appen are adaptable and may be customised to match the project's unique needs. For high-quality annotated data, the company offers a variety of quality control procedures, such as having many annotators label the same data, doing quality assurance tests, and continuously tracking annotator performance. Appen also provides its services in multiple languages.

2. Amazon Mechanical Turk - Businesses can post data labelling tasks on MTurk, outline the specifications, and pay employees for their labour. The platform offers resources for task management and quality control, including the ability to reject unsatisfactory work and request modifications.

Since multiple people can work on the same activity at once, MTurk is an economical approach to swiftly categorise large amounts of data. However, because the annotators may have various levels of knowledge and drive, the quality of the data labelled through MTurk may be inconsistent. Use of quality control measures, such as having numerous annotators label the same data and comparing the findings, as well as thorough screening and management of the annotators are necessary to assure high-quality data labelling.

3. Data loop AI - Computer vision, natural language processing, and robotics are just a few of the industries that DataLoop.AI serves with its AI-powered data labelling services. Both automatic data labelling using machine learning algorithms and manual data labelling using human annotators are services

offered by the company. While human annotators tackle more difficult jobs like sentiment analysis and text categorization, the company's AI algorithms are made to handle mundane tasks like object detection and image segmentation.

Models are constantly fed with high quality data to increase the accuracy level. As datasets grow, labelling productivity and efficiency become more and more important, with accidental clicks soon adding up to countless hours lost. Annotation accuracy is especially detrimental since mistakes made by humans during the data preparation process can feed models with inaccurate information, lowering accuracy and harming performance.

In order to pre-annotate the data before human labelling, ML teams can use Dataloop to incorporate their models into the annotation platform. Labeling teams can save between 60% and 90% of the time spent on each batch by reducing the human annotation process into a straightforward auditing operation.

4. V7 labs - V7 labs provides data annotation and labelling services to all the industries. Companies and business can hire expert labelers who care about AI training data accuracy. It follows a 3 step process to label data. V7 labs read data directly from user's data warehouse or cloud provider. It then adds models for preprocessing and route tasks to the expert labelers based on detected objects. The last step is to monitor progress. Complete visibility of every label is gained and edge cases are resolved.

In automated workflows, V7 is intended to provide the appropriate task to the appropriate person while eliminating spreadsheets, data breaches, and poor quality control. V7 labs is completely scalable as per the need of the client company or user. More labelers can be added or hired to support scaling ventures. Built in plugin models are used to automate consuming tasks and provide data security.

- **Gather information about these 4 services:**
 - **Do they offer the same kind of service?**
 - **For what tasks?**
 - **Do the people doing the annotation have any expertise?**
- **Present a comparative table of the 4 services explored. In your comparative table, there should be at least 5 criteria for comparison. 3 out of 5 criteria can be the 3 questions above, and you can add 2 other criteria of your choice.**

	Do they offer same kind of services?	Tasks	Expertise of human annotators	Scalability	Uses and Other services
APPEN	Manual data labeling, crowdsourcing	Data labeling, Data collection, Image and video annotation	Carefully managed to provide high quality data annotation using quality assurance and training	Yes	Data enrichment, Custom projects, Technology solutions
AMAZON MECHANICAL TURK	Manual data labeling, crowdsourcing	Data labeling, Human intelligence, Surveys	Varies widely as anyone is allowed to work. Expertise not guaranteed	Yes	Identifying objects in a photo or video, Performing data duplication, Transcribing audio recording or researching data details
DATA LOOP AI	Automatic and manual data labeling	Data management, Automation pipeline, Annotation platform	Highly specialised and knowledgeable in their respective field	Yes	Annotation studio tools, Automatic annotation, Video annotation, Workforce management
V7 LABS	Manual data labeling, crowdsourcing	Data cleaning, data validation and data annotation	Highly specialised and knowledgeable in their respective field	Yes	Image and video annotation, Documents processing, Auto annotation