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SIT123: Data Capture Technologies

Lab Work Week 5.1: Ethical issues (30 marks)

In this task you will investigate ethical concerns in a given a case study.

Due Date Friday 5:00pm, 2nd September 2022

Pre-requisites: You must do the following before this task

1. **Attend Class (Lecture) & Seminar**
2. **Completed previous Lab works**
3. **Read this sheet from top to bottom**

Task Objective

Read the case studies given below and consider their ethical concerns.

Case study 1:

Consider the GPS data you collected and mapped previously. Now imagine your GPS traces were collected for a period of 30 days, and shared publicly with your name without your knowledge.

Case study 2:

Consider the context of some data collected using motion sensors. Here, data was collected from a motion sensor installed in a user's (John Doe) bathroom. John Doe is an elderly gentleman between 65-75 years, and he lives by himself in his own home.

The data was part of John's smart home system, which has motion sensors installed in every room. All the sensor data being collected from John's house, including his bathroom is uploaded to a cloud server. The company who built the smart home system has access to John's collected sensor data in the cloud, and their artificial intelligent algorithms use the collected data to learn about John's behaviors and feed the learned patterns back to John's smart home. John's smart home uses these learned patterns to make various decisions such as automating lights, heating and if John is well (based on his activity). All of John's data includes his name and address.

John himself does not have access to his data in the cloud.

Task Submission Details

There are 5 questions in this task. Answer all of them in this word document itself and submit to unit site.

Q1: In case study 1, what should have been explained and obtained prior to sharing your GPS traces publicly? Why?

(6 marks)

Being aware of potential threats and risks is essential. The potential benefits of the study must exceed any possible drawbacks, and individuals' rights to privacy, confidentiality, and ownership over their data must be safeguarded. The people whose data is utilised must be given clear, concise results of the research as soon as possible. In the end, research has to be carried out by people who are well trained.

Q2: What are some ethical concerns in case study 1?

(6 marks)

They might be the target of a robbery attempt. Thieves will have a much easier time stealing from this individual because of how well they know their schedule and location. The individual's right to privacy will be violated since his past movements may be tracked by anybody with access to the data. Because of, say, his job schedule, he is unable to return home at a certain time. For fear of discrimination or harassment, many individuals are reluctant to discuss their favourite hangouts. Participating in group activities like as

Q3: What are some ethical concerns in case study 2?

(6 marks)

Concerns about John's privacy may be high on the list if his information is shared without his knowledge or consent. Any number of items, including but not limited to medical equipment and medications, may be marketed to John if a corporation were to acquire his personal information and utilise it for such purposes. •The smart home checks in on the john to make sure he's okay, but if something goes wrong—like a fault in the system—it may needlessly alert emergency services, which could be a waste of time and money. The researchers may use John's regular routine without his awareness (when he sleeps, where he goes, how often he eats, etc.) •If a hacker or criminal obtains John's information, he might be in deep difficulty, including financial loss.

Q4: What adverse effects may arise as a result of the aforementioned ethical concern/s? Explain using examples.

(6 marks)

Moral problems may have far-reaching effects. Theft or damage to personal property is the worst consequence. People's everyday actions, such as when they sleep, eat, and go out, are scrupulously recorded. If this information gets out, the victim might face physical violence, theft, or both. Newer Roomba vacuums record data while cleaning, including wall and furniture

placements, and transmit it to Amazon, Apple, and Google. Data is the new oil due of its tremendous worth. Many large firms are gathering petabytes of data to use internally or sell for advertising. Target sent discounts to a pregnant lady, who subsequently told her father. Technology uses our habits and routines. Amazon's AI predicts consumers' wants and ships products before they buy.

Q5: Explain how one of the ethical concerns you mentioned can be addressed.

(6 marks)

Data theft is easy and anybody can do it, therefore it's crucial to utilise simple, effective measures to secure our data. It's important to recognise anybody or anything trying to access our technological gadgets. To prevent this, we may incorporate multi-factor authentication and an instant notice to our phone or phone if someone tries to utilise our location, camera, or other functions. Only a rigors background check on every employee and home user can ensure sensitive information isn't exploited. Determine whether the user's behaviours threaten our data and are dangerous. Third, we must increase our expertise of data management. Training the cyber staff on phishing scam may help everyone. A single individual may modify well-defined procedures and circumstances to prevent data breaches and the theft and exploitation of sensitive information.

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Lab Work Week 5.2: Data Capture Scenarios (30 marks)

In this task you will investigate two scenarios that involve capturing data and making inferences based in the data.

You can use similar ideas for your project.

Due Date Friday 5:00pm, 2nd September 2022

Pre-requisites: You must do the following before this task

1. **Attend Class (Lecture) & Seminar**
2. **Read this sheet from top to bottom**

Task Objective

Read the project ideas given below and consider their requirements

Scenario 1:

John has two plants on the balcony of his house. These plants require constant attention and caring. He has to water them when they require and make sure the soil moisture is kept at optimum levels. Otherwise the plants will not be in good shape and may not survive. John has become very busy these days and with his age it is hard for him to keep record and remember when to water the plants. He is looking for a smart solution to notify him when the plants need to be watered. Such a solution needs to provide a notification using an LED light connected to the pot to indicate when the soil moisture is below and over a certain limit. In addition, John also wants to find out if both plants require the same amount of water, or if he should be watering them different levels.

Note: Assume that both plants are planted in identical pots, using identical potting mix.

Scenario 2:

Jane, Megan and Kim are university students who enjoy cycling. Since they live in different suburbs, they usually cycle on their own, and not together. They think that it will be interesting to compare where they've been cycling. They want to see if they can find out some common areas and times to cycle together, based on things like distance, elevation, day of the week and times of the day.

Task Submission Details

There are 8 questions in this task. Answer all of them in this word document itself and submit to unit site.

Q1: Propose a solution to the problem given in Scenario 1, using the Sense-Think-Act paradigm. Give an overview of your proposed solution, and outline its Sense-Think-Act requirements.

- (5 marks)

John is a highly busy and elderly individual who cannot regularly tend to his plants. John has devised a solution in the shape of an Arduino gardener. Therefore, the moisture sensor will first be utilised to measure the soil's moisture content. The water level sensor will then be used to monitor the water levels in both pots, since John wanted to know the water levels so that he does not offer too much or too little water. John has now developed a solution. But he also needs to know when soil moisture is below or beyond a specific level, therefore John has programmed Arduino to emit SOS light signals whenever the soil moisture is below or above the specified amount.

Q2: Propose a solution to the problem given in Scenario 2, using the Sense-Think-Act paradigm. Give an overview of your proposed solution, and outline its Sense-Think-Act requirements.

- (5 marks)

In order to start bicycling together, Jane, Meghan, and Kim need to identify the same parts of the city and the same times when they all have to ride through. They solved the problem by using a variety of apps to monitor their whereabouts while they pedalled about. This means that by keeping tabs on their whereabouts, they will be able to piece together a timeline of their travel based on the timestamps of the many stops along the way. On the other side, they all made a GPX file of their positions, so they have a report they can use to simply determine their elevation. They will be able to determine where everyone was at the same moment by comparing their current positions. Now they know they can share the road.

Q3: What kinds of hardware do you think can be used to solve the problem in scenario 1?

- (3 marks)

Arduino Uno .Moisture Sensors .Water Level Sensors .Data logger shield and Jumper wires

Q4: What kinds of hardware do you think can be used to solve the problem in scenario 2?

(3 marks)

A GPS-enabled tracking app on a smart phone Mobile Device or Desktop Computer

Q5: Think of a data collection approach to be used in Scenario 1.

- a) What things can result in 'dirty data' in this case?
Duplicate or Incomplete data
- b) What can you do to clean the data?
Excel is a simple tool that can be used to clean and fix this kind of data, among many others.

(4 marks)

Q6: Think of a data collection approach to be used in Scenario 2.

- a) What things can result in 'dirty data' in this case?
Insecure data and an abundance of data
- b) What can you do to clean the data?
Microsoft Excel and IBM InfoSphere can be used to clean up this kind of unclean data, but we still need to take precautions to prevent it from falling into the wrong hands.

(4 marks)

Q7: Propose some ways to extend your proposed solution for scenario 1.

(3 marks)

John is an exceptionally bright individual, and he proposed certain improvements that would have made the solution even stronger. First, John had a buzzer placed in addition to the led lights so that he would be warned and alerted no matter where he was in the home. John might also benefit from an advanced programme like "Bylnk App," which would send him push notifications if the soil moisture in his yard drops below a certain threshold. When the water level in the planters becomes low, John may activate the automatic water machine to water the plants.

Q8: Propose some ways to extend your proposed solution for scenario 2.

(3 marks)

There aren't many ways to make this solution more comprehensive, but one thing that can be done is to recommend that the three girls use a high-end journey tracking app like Apple's

cycle tracking service, which will keep their data safe and give them access to insightful, in-depth information about their rides.