Significance of Fractal Analysis

IMPACT OF THIS COMPUTING INNOVATION

001.

ALZHEIMER DETECTION

Fractal Analysis can be used to detect early signs of Alzheimer's and Dementia disease. This is done through the studying of paint strokes in a artist's paintings.

002.

FOREST FIRE EVOLUTION

Another way that Fractal Analysis is used is in forest fire detection. The computer program is able to mathematically analyze fire regime data.

003.

CANCER DIAGNOSIS

Fractal Analysis is commonly used in the medical field. Scientists and doctors use this computing innovation to analyze damaged DNA.

ANNA LEON (p1)

Explore — Impact of Computing Innovations
Written Response Submission Template

Submission Requirements

2. Written Responses

Submit one PDF document in which you respond directly to each prompt. Clearly label your responses **2a–2e in order.** Your responses must provide evidence of the extensive knowledge you have developed about your chosen computing innovation and its impact(s). Write your responses so they would be understandable to someone who is not familiar with the computing innovation. Include citations, as applicable, within your written responses. **Your response to the first four prompts (2a–2d) combined must not exceed 700 words.**

Computational Artifact

2a. Provide information on your computing innovation and computational artifact.

- Name the computing innovation that is represented by your computational artifact.
- Describe the computing innovation's intended purpose and function.
- Describe how your computational artifact illustrates, represents or explains the computing innovation's intended purpose, its function or its effect.

TOTAL WORD COUNT: 621 words

(100 words)

The computing innovation that is represented by my computational artifact (infographic) is Fractal Analysis. Fractal Analysis is the evaluation of fractal characteristics of data. In other words,the purpose of this computing innovation is to have a software used to assess a mathematical set that demonstrates a repeating pattern. The function is to identify these repeating patterns in everyday life; whether it be in natural phenomena (forest fire evolution, (3) biology, geology, etc.) or man-made objects (paintings,music, etc.). My infographic shows the significance of Fractal Analysis. Three impacts that Fractal Analysis has had on scientific research is shown in the infographic.

2b. Describe your development process, explicitly identifying the computing tools and techniques you used to create your artifact. Your description must be detailed enough so that a person unfamiliar with those tools and techniques will understand your process.

(115 words)

For my topic of Fractal Analysis, I decided that an infographic would best represent my topic. So, I used an infographic template to create an infographic that best represents Fractal Analysis. The website that I used to make the infographic is InfographVenngage.com. This website contains many templates for infographics. I chose the infographic template that allowed me to show three effects of my computing innovation. For those three effects, I chose to use "Alzheimer's Detection", "Forest Fire Evolution", and "Cancer Diagnosis". Beneath these effects is a brief description on how Fractal Analysis is associated with them. For example, beneath "Alzheimer's Detection", I described how Fractal Analysis analyzes paintings to detect early signs of Alzheimer's.

Computing Innovation

2c. Explain at least one beneficial effect and at least one harmful effect the computing innovation has had, or has the potential to have, on society, economy, or culture.

(252 words)

A beneficial effect of the computing innovation of Fractal Analysis is the amount of fields that it is able to help. For example, Fractal Analysis is used in the study of geology and urban growth, computing and gaming design. Therefore, it is able to benefit society and it's culture. A main benefit that stood out to me, however, was gaming design. This was because while I knew that Fractal Analysis helped in various branches of work, this was one that I never would have guessed. According to (1) Maynooth University, Fractal Analysis is used for assessing patterns and outputs. Therefore, it helps gaming design through the analysis of computer graphics. This is especially shown in computer graphics for organic environments.

Despite all of the benefits that comes with Fractal Analysis, there are also many harmful effects. For example, it has a large margin of error. While small margins of error are okay and even normal, large margin of errors are an indication that this innovation is not as developed as others. According to (2) ijirset.com, the margin of error for Fractal Analysis is over five percent. Because of this, Fractal Analysis' applications are affected. For example, since Fractal Analysis can be applied in many branches (geology, urban growth, game design, archeology, cancer research, electrical engineering, etc.), the error applies to all of those branches. In other words, there is a greater chance of making an error in many fields of work, instead of just one. Therefore, the harmful effect of this innovation affects society.

2d. Using specific details, describe:

- The data your innovation uses.
- How the innovation consumes (as input), produces (as output), and/or transforms data.
- At least one data storage concern, data privacy concern, or data security concern directly related to the computing innovation.

(154 Words)

It is important to know the characteristics of Fractal Analysis. This is because it has many uses, as well as functions. Fractal Analysis is the analysis of fractal characteristics of data. Fractal characteristics of data, also known as evolving symmetry, are mathematical sets that exhibits a repeating pattern displayed at every scale. This computing innovation consumes data (as input) via the use of mathematical equations. These math equations use string rewriting; which is a common technique used in analysis of natural phenomenons such as neurons, blood vessels, and many more. Some natural phenomena found with fractal features are snowflakes, trees, trees, earthquakes, etc.

Despite the benefits and all of the uses of Fractal Analysis, there still are some rising concerns. For example, the data security concern. Because Fractal analysis makes use of mathematical equations, it stores the data in a software. The algorithms used to analyze repeating patterns are not seen as securely stored.

References

2e. Provide a list of at least three online or print sources used to create your computational artifact and/or support your responses to the prompts provided in this performance task.

- At least two of the sources must have been created after the end of the previous academic year.
- For each online source, include the permanent URL. Identify the author, title, source, the date you retrieved the source, and, if possible, the date the reference was written or posted.
- For each print source, include the author, title of excerpt/article and magazine or book, page number(s), publisher, and date of publication.
- If you include an interview source, include the name of the person you interviewed, the date on which the interview occurred, and the person's position in the field.
- Include citations for the sources you used, and number each source accordingly.
- Each source must be relevant, credible, and easily accessed.

1 "Can paint strokes help identify Alzheimer's? | Maynooth University." 29 Dec. 2016, https://www.maynoothuniversity.ie/news-events/can-paint-strokes-help-identify-alzheimer-s. Accessed 6 Feb. 2017.

2 "Fractal Characterisation of Forest Fire Evolution Using ... - IJIRSET." https://www.ijirset.com/upload/2017/january/73_Fractal.pdf. Accessed 6 Feb. 2017.

3 "Diagnosis of Lung Cancer by Fractal Analysis of Damaged ... - Hindawi." 24 Mar. 2015, https://www.hindawi.com/journals/cmmm/2015/242695/. Accessed 6 Feb. 2017.

Sample Response A, C, D, E

Criteria	Points Earned	WHY this sample **EARNED** this point	WHY this sample **DID NOT Earn** this point
Criteria 1: The computational artifact identifies the computing innovation and provides an illustration, representation, or explanation of the computing innovation's intended purpose, function, or effect.	1	The infographic provides thorough information about the computational innovation's significance.	
Criteria 2: States a plausible fact about the computing innovation's intended purpose or function. Response 2a	1	I wrote about a fact about the innovation's function/purpose.	
Criteria 3: Identifies at least ONE effect of the computing innovation Response 2c	1	I included one effect of the innovation.	
Criteria 4: Identifies a beneficial effect AND a harmful effect of the computing innovation. Explains how ONE of the identified effects impacts society, economy, or culture. Response 2c	1	I identified one beneficial and harmful effect on society/culture.	
Criteria 5: Identifies the data that the computing innovation uses. Explains how that data is consumed, produced, OR transformed Response 2d	1	I identified data it uses and how it is consumed/transformed.	
Criteria 6: Identifies one storage, privacy, OR security concern. Explains how the concern is related to the computing innovation. Response 2d	0		While I did include one security concern, I feel that my explanation was not thorough enough to understand.
Criteria 7: Provides inline citations of at least 3 attributed sources with the written response. The citations must be used to	1	I provided 3 citations in 2e and used all 3 of them to help me	

justify the response. Response 2e		respond to the questions.	
Total	6/7		