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Estimating the Effect of Radiation of Five Types of Uranium Minerals Using the Graph Method

Nihad Shareef Khalaf[1], **Aasha Abdulkhleq Ismael**[2],
Zainab Abood Ahmed Al-Bairmani[3], **Samer R. Yassen**[4]

[1]Department of Mathematics
College of Education for Women
Tikrit University
Tikrit, Iraq

[2]*College of Administration & Economics
Tikrit University
Tikrit, Iraq

[3]Department of Studies & Planning
University of Babylon
Babil, Iraq

[4]Department of Mathematics
College of Education for Pure Sciences
Tikrit University
Tikrit, Iraq

email: Nihad.shreef16@tu.edu.iq, Aasha.a.alkaleq@tu.edu.iq,
Zanab.abboud@uobabylon.edu.iq, samer2017@tu.edu.iq

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Abstract

The current study aims to develop mathematical techniques to predict the impact of uranium radioactivity on humans using five minerals; namely, Urbanite, Craniate, Austenite, Samarskite, and Brannerite, using the graph method. We use this technique for calculating uranium radioactivity concentration in these minerals, and obtain different sets of results.

1 Introduction

Graph theory is important in many fields of daily life, including biological sciences, chemistry, electrical and electronic engineering (interpersonal interaction connections computing concept), as well as software engineering and operational studies, among others [1, 2]. Graph theory has implications in all fields of science including many contemporary data and technology developments. The graph G is defined as $Q = (M, N)$, wherein $M(H)$ is the collection of H's vertices and $N(H)$ represents the set of H's edges. Cut-set is a collection H of edges that when removed from H leave H unconnected outcomes. Each cut-set of the compatible graph H has a specific amount of edges.

The amount of linkages in the lowest cut-set, as well as the suitability graph's vertices connectedness H is regarded as the lowest amount of vertex removed from H leaving the remainder of graph unconnected [3, 4, 5].

Haregeweyn and Yohannes [6] estimated the non-agricultural pollution model (AGNPS) on watersheds in Ethiopia . After that, Michael et al. [7] studied the second generation computer software for internal dose assessment in nuclear medicine. Ilyas et al. [8] studied the estimation and comparison of the diffuse solar radiation spread over Pakistan. Finally, Arshad [9] investigated the calculation of levels temperatures for heat circuits using a spectral approach, while Balter et al. [4] investigated examining Skin Input Calculations Radioactive dose estimation approaches for fluoroscopically assisted operations A. In this article, we looked at a graphical approach for calculating the quantity of uranium radiation's impact on five distinct kinds of minerals. Stephen et al. [10] have conducted numerous hypothetical researches in the last few years, employing fluoroscopy to assess the radioactive dosage on the skin using extensively researched methodologies.

2 Practical Side: Creation mathematical models for estimating $U\,(qr1\ )$ calculations via qr using graph theory.

On the practical side, we estimated the quantity of uranium using the graph approach and the effect for radiation on a random sample of people. We will consider all possibilities to estimate the uranium radiation exposure on a random sample of people, which numbered 10 probabilities, and then make a comparison between these possibilities and choose the best estimates.

By applying the graph method on the interval [2, 7] in Table 1 to calculate the mean uranium concentrations found in urea tests for a sample of people, $(qr1)$ is the rate center for uranium $U_l\,(qr1)$ on a sample of people. We obtained the following equation:

$U_l\,(qr1) = U_1\,(qr1) + \frac{u(qr_2)-u(qr_1)}{(qr_2)-(qr_1)}qr1$

$$= 2.21 + \frac{2.37-2.21}{7-2}qr1 = 2.21 + \frac{0.16}{5}qr1 = 2.21 + 0.032qr1 \qquad (2.1)$$

Table 1: $U\,(qr1)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr1$	Classes People Exp. $U\,(qr1)$	Classes People Det. $U\,(qr1)$	Absolute Error
1	Urbanite	2	2.21	2.274	0.064
2	Craniate	7	2.37	2.434	0.064
3	Austenite	11	2.39	2.562	0.172
4	Samarskite	15	2.63	2.69	0.06
5	Brannerite	21	2.70	2.882	0.182
					$\sum 0.542$

Figure 1: $U\,(qr1)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [7, 11] in Table 2 to calculate the mean uranium content in urea collections for a sample of people, $(qr2)$ is the rate center for uranium $U_l\,(qr2)$ on a sample of people. We obtained the following equation:

$$U_i\,(qr2) = U_2\,(qr2) + \tfrac{u(qr_3\ )-u(qr_2)}{(qr_3)-(qr_2)}qr2$$

$$= 2.37 + \frac{2.39-2.37}{11-7}qr2 = 2.37 + \frac{0.02}{4}qr2 = 2.37 + 0.005qr2 \qquad (2.2)$$

Table 2: $U\,(qr2)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr2$	Classes People Exp. $U\,(qr2)$	Classes People Det. $U\,(qr2)$	Absolute Error
1	Urbanite	2	2.21	2.38	0.17
2	Craniate	7	2.37	2.405	0.035
3	Austenite	11	2.39	2.425	0.035
4	Samarskite	15	2.63	2.445	0.185
5	Brannerite	21	2.70	2.475	0.225
					$\sum 0.65$

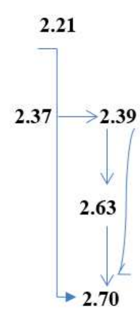

Figure 2: $U\,(qr2)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [11, 15] in Table 3 to calculate the mean uranium content in urea collections for a sample of people, $(qr3)$ is the rate center for uranium $U_l(qr3)$ on a sample of people. We obtained the following equation:

$$U_i\,(qr3) = U_3\,(qr3) + \tfrac{u(qr_4)-u(1qr_3)}{(qr_4)-(qr_3)}qr3$$

$$= 2.39 + \frac{2.63-2.39}{15-11}qr3 = 2.39 + \frac{0.24}{4}qr3 = 2.39 + 0.06qr3 \qquad (2.3)$$

Table 3: $U\,(qr3)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr3$	Classes People Exp. $U\,(qr3)$	Classes People Det. $U\,(qr3)$	Absolute Error
1	Urbanite	2	2.21	2.51	0.3
2	Craniate	7	2.37	2.81	0.44
3	Austenite	11	2.39	3.05	0.66
4	Samarskite	15	2.63	3.29	0.66
5	Brannerite	21	2.70	3.65	0.95
					$\sum 3.01$

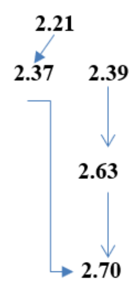

Figure 3: $U\,(qr3)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [15, 21] in Table 4 t to calculate the mean uranium content in urea collections for a sample of people, (qr) is the rate center for uranium $U_l(qr)$ on a sample of people. We obtained the following equation:
$U_i\,(qr4) = U_4\,(qr4) + \frac{u(qr_5)-u(qr_4)}{(qr_5)-(qr_4)} qr4$

$$= 2.63 + \frac{2.70 - 2.63}{21 - 15} qr4 = 2.63 + \frac{0.07}{6} qr4 = 2.63 + 0.01166667 qr4 \quad (2.4)$$

Table 4: $U\,(qr4)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr4$	Classes People Exp. $U\,(qr4)$	Classes People Det. $U\,(qr4)$	Absolute Error
1	Urbanite	2	2.21	2.6533	0.4433
2	Craniate	7	2.37	2.7117	0.3417
3	Austenite	11	2.39	2.5183	0.1283
4	Samarskite	15	2.63	2.805	0.175
5	Brannerite	21	2.70	2.875	0.175
					$\sum 1.2633$

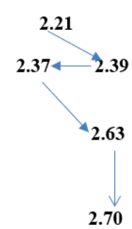

Figure 4: $U\,(qr4)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [2, 11] in Table 5 to calculate the mean uranium content in urea collections for a sample of people, $(qr5)$ is the rate center for uranium $U_l(qr5)$ on a sample of people. We obtained the following equation:

$$U_i\,(qr5) = U_1\,(qr5) + \tfrac{u(qr_3)-u(qr_1)}{(qr_3)-(qr_1)}qr5$$

$$= 2.21 + \frac{2.39-2.21}{11-2}qr5 = 2.21 + \frac{0.18}{9}qr5 = 2.21 + 0.02qr5 \tag{2.5}$$

Table 5: $U\,(qr5)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr5$	Classes People Exp. $U\,(qr5)$	Classes People Det. $U\,(qr5)$	Absolute Error
1	Urbanite	2	2.21	2.25	0.04
2	Craniate	7	2.37	2.35	0.02
3	Austenite	11	2.39	2.43	0.04
4	Samarskite	15	2.63	2.51	0.12
5	Brannerite	21	2.70	2.63	0.07
					$\sum 0.29$

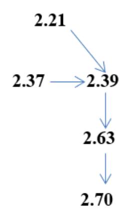

Figure 5: $U\,(qr5)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [11, 21] in Table 6 to calculate the mean uranium content in urea collections for a sample of people, $(qr6)$ is the rate center for uranium $U_l(qr6)$ on a sample of people. We obtained the following equation:
$U_i\,(qr6) = U_3\,(qr6) + \frac{u(qr_5)-u(qr_3)}{(qr_5)-(qr_3)}qr6$

$$= 2.39 + \frac{2.70 - 2.39}{21 - 11}qr6 = 2.39 + \frac{0.31}{10}qr6 = 2.39 + 0.031qr6 \qquad (2.6)$$

Table 6: $U\,(qr6)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr6$	Classes People Exp. $U\,(qr6)$	Classes People Det. $U\,(qr6)$	Absolute Error
1	Urbanite	2	2.21	2.435	0.225
2	Craniate	7	2.37	2.5975	0.2275
3	Austenite	11	2.39	2.7275	0.3375
4	Samarskite	15	2.63	2.8575	0.2275
5	Brannerite	21	2.70	3.0575	0.3525
					$\sum 1.37$

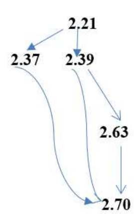

Figure 6: $U\,(qr6)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [7, 15] in Table 7 to calculate the mean uranium content in urea collections for a sample of people, $(qr7)$ is the rate center for uranium $U_l(qr7)$ on a sample of people. We obtained the following equation:
$U_i\,(qr7) = U_2\,(qr7) + \frac{u(qr_4)-u(qr_2)}{(qr_4)-(qr_2)} qr7$

$$= 2.37 + \frac{2.63-2.37}{15-7} qr7 = 2.37 + \frac{0.26}{8} qr7 = 2.37 + 0.0325 qr7 \qquad (2.7)$$

Table 7: $U\,(qr7)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr7$	Classes People Exp. $U\,(qr7)$	Classes People Det. $U\,(qr7)$	Absolute Error
1	Urbanite	2	2.21	2.452	0.242
2	Craniate	7	2.37	2.607	0.237
3	Austenite	11	2.39	2.731	0.341
4	Samarskite	15	2.63	2.855	0.225
5	Brannerite	21	2.70	3.041	0.341
					$\sum 1.386$

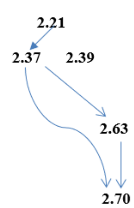

Figure 7: $U\,(qr7)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [2, 15] in Table 8 to calculate the mean uranium content in urea collections for a sample of people, $(qr8)$ is the rate center for uranium $U_l(qr8)$ on a sample of people. We obtained the following equation:
$U_i\,(qr8) = U_1\ \ (qr8) + \frac{u(qr_4)-u(qr_1)}{(qr_4)-(qr_1)} qr8$

$$= 2.21 + \frac{2.63-2.21}{15-2} qr8 = 2.21 + \frac{0.42}{13} qr8 = 2.21 + 0.03230769 qr8 \quad (2.8)$$

Table 8: $U\,(qr8)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr8$	Classes People Exp. $U\,(qr8)$	Classes People Det. $U\,(qr8)$	Absolute Error
1	Urbanite	2	2.21	2.2746	0.0646
2	Craniate	7	2.37	2.4362	0.0662
3	Austenite	11	2.39	2.5654	0.1754
4	Samarskite	15	2.63	2.6950	0.065
5	Brannerite	21	2.70	2.8884	0.1884
					$\sum$ 0.5596

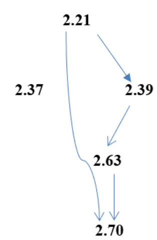

Figure 8: $U\,(qr8)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [7, 21] in Table 9 to calculate the mean uranium content in urea collections for a sample of people, $(qr9)$ is the rate center for uranium $U_l(qr9)$ on a sample of people. We obtained the following equation:

$U_i\,(qr9) = U_2\,(qr9) + \frac{u(qr_5)-u(qr_2)}{(qr_5)-(qr_2)}qr9$

$$= 2.37 + \frac{2.70-2.37}{21-7}qr9 = 2.37 + \frac{0.33}{14}qr9 = 2.37 + 0.02357143qr9 \quad (2.9)$$

Table 9: $U\,(qr9)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr9$	Classes People Exp. $U\,(qr9)$	Classes People Det. $U\,(qr9)$	Absolute Error
1	Urbanite	2	2.21	2.2616	0.0516
2	Craniate	7	2.37	2.3905	0.0205
3	Austenite	11	2.39	2.4937	0.1037
4	Samarskite	15	2.63	2.5968	0.0332
5	Brannerite	21	2.70	2.7516	0.0516
					$\sum$ 0.2606

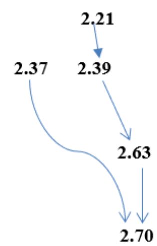

Figure 9: $U\,(qr9)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

By applying the graph method on the interval [2, 21] in Table 10 to calculate the mean uranium content in urea collections for a sample of people, $(qr10)$ is the rate center for uranium $U_l(qr10)$ on a sample of people and we obtained the following equation:

$U_i\,(qr10) = U_1\,(qr10) + \frac{u(qr_5)-u(qr_1)}{(qr_5)-(qr_1)} qr10$

$$= 2.21 + \frac{2.70 - 2.21}{21 - 2} qr10 = 2.21 + \frac{0.49}{19} qr10 = 2.21 + 0.02578947 qr10 \quad (2.10)$$

Table 10: $U\,(qr10)$ employing the qr and then contrasting them to the values of experimentation determined by the graph technique.

No	Name	Rate uranium of Mineral $qr10$	Classes People Exp. $U\,(qr10)$	Classes People Det. $U\,(qr10)$	Absolute Error
1	Urbanite	2	2.21	2.4171	0.2071
2	Craniate	7	2.37	2.5350	0.165
3	Austenite	11	2.39	2.6293	0.2393
4	Samarskite	15	2.63	2.7236	0.0936
5	Brannerite	21	2.70	2.8650	0.165
					$\sum 0.87$

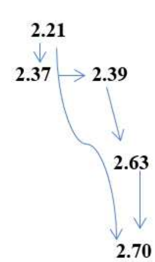

Figure 10: $U\,(qr10)$ employing the qr and contrasting them to the values of experimentation determined by the graph technique.

3 Conclusion

We used the graph approach to calculate the quantity of uranium and the effect of radiation on a random sample of people. We had ten possibilities representing the number of paths that could be taken to estimate the uranium radiation exposure on a random sample of people, and then we made a comparison between these possibilities and chose the best estimate. The outcomes are outlined below:

1- The best path is the one that occurs in the interval [2, 21], because the absolute error rate is 0.2606 less than all the periods we took.

2- The worst path is that which occurs in the interval [11, 15], because the absolute error rate is 3.01 and it is the largest possible.

Therefore, the path to be taken is the one in which the absolute error rate is the least possible.

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