Regression modeling of Iraq Iran war using Lancaster/osipov war models

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Abstract: Iran and Iraq war data were obtained from internet and curve-fitted with Lanchester/Osipov war model. It was found that the data obeys the square law and that the war was a mixed one of 10.8% guerilla and 89.2% conventional as depicted by their parameters in the model. Also it was found that Iraq heavily used Chemical weapon (e.g. mustard gas, arsenic, mytotoxic) against Iranian soldiers. This is shown in the chemical casualty graph (Fig. 3). The continuous claim by the Iranians that the war was forced on them is shown in the initial commitment of troops to the war (Iraq (Rₜₐ₝) = 6484, Iran (Bₜₐ₝) = 2962). The inequality in the defensive and offensive parameters of the warring countries is found to be a: b = 12.34:1 signifying unequal fire power.

Keywords: Regression, curve-fitting, Iraq, Iran, war, Lanchester, Osipov, conventional guerrilla.

I. BACKGROUND STUDY

Description of War
War is a conflict between nations or states carried on by force of considerable duration and magnitude by land, sea, or air for obtaining and establishing the superiority and dominion of one over the other for some cause. It is defined more concisely as the state of usually open and declared armed hostile conflict between states or nations [1,2]. Among the causes of war are ideological, political, racial, economic and religious conflicts. According to Karl Von Clausewitz [3] was is a continuation of political intercourse by other means and often occurs after means of compromise and mediation have failed. Throughout history, was has been a topic of analysis for scientist and researchers, especially following World War II. In the shadow of a possible outbreak of nuclear was between the United States and Russia, more research has been done on the subject of war than ever before [3, 4].

The Conventional or Direct Fire Model
This model describes historic battles like those fought in the Napoleonic and Civil Wars. Armies or navies lined up opposite each other and fired until one retreated and the other was victorious. The effectiveness of that fire and the number of combatants in each group will determine the outcome of the battle [5,6].

In the conventional model, the rate at which one force loses its fighters is proportional to the number of opponents. The constant of proportionality is a measure of the quality of armament and the level of ability of the opposing force [6,8].

The Guerilla Combat Model
This model describes situations like battles fought by guerilla groups in Lebanon. Soldiers can’t see their opponents, but know that they are hiding in a region (perhaps of a city or in the jungle). They fire indiscriminately into the region hoping to hit their opponents. The larger the force in the region, the more likely they are to get hit, so a guerilla combat unit is generally quite small [7, 9].

In the guerilla campaign, the rate at which one force loses its fighters is jointly proportional to the number of opponents and the number of its own soldier in the region of combat [10]. The constant of proportionality is a measure of the quality of armament and the level of ability of the opposing force and of the style of combat. It is typically between one hundredth and one thousandth of that for conventional combat (lots of shots are fired that miss their targets).

The Mixed Combat Model
This is a mixture of conventional and guerilla models. It has the characteristics of both conventional as well as guerilla warfare [10].

The NBC Combat Model
This technologically-advanced warfare involves using the toxic, nauseating, gasping, suffocating, wheezing, irritating etc. properties of nuclear, biological and chemical (NBC) substances as weapons of war. It has no mathematical combat model presently and belongs to different class of warfare. However, there are NBC substances dissemination models. For instance, chemical agents are classified as having persistent or non-persistent effects [11 – 13].

Combat Modeling
Almost all leading armies in the world now engage in sophisticated combat modeling and war gaming exercises. Many have developed proprietary capability to support their military strategists. In the Western world, organizations such as the RAND Corporation [14, 15] have been engaged in such projects now for over 50 years.

The Lanchester Model of Combat
The state-of-art method for quantitatively projecting the aggregate progress of combat under various combat scenarios is known as the Lanchester Attrition Model [16, 17] and its variations [18 – 20]. Lanchester models are coupled differential equations based on certain
The generalized Lanchester’s equations are of the form:

\[ \dot{B}(t) = aR(t)^p B(t)^q \]  

(1)

\[ \dot{R}(t) = bB(t)^p R(t)^q \]  

(2)

Dividing equation (1) by equation (2) we have:

\[ \frac{\dot{B}}{\dot{R}} = \frac{aR^q B^p}{bB^q R^p} = \frac{aR^q}{bR^p} \]  

(3)

or \( bB^p = aR^q \), \( \dot{B} = aR^q \). \( \dot{R} \) …………………………… (3)

Integrating both sides of eqn (3) inserting limits of integration we have

\[ \frac{b}{R^p - q + 1} \int_{B_0}^{B} \frac{B^{p-q+1}}{B^{q+1}} dB = a \int_{R_0}^{R} \frac{R^{p-q+1}}{p-q+1} dR \]

or \( b \left( B^{p-q+1} - B^{q+1} \right) = a \left( R^{p-q+1} - R^{q+1} \right) \)

Let \( m = p - q + 1 \), therefore

\[ b \left( B^m - B^m \right) = a \left( R^m - R^m \right) \]  

(4)

Eqn (4) is the generalized Lanchester mth law war model.

If \( p-q = 0 \) or \( p = q \) so that \( m = p+q-1 = 0+1 = 1 \)

We obtain eqn (5) the Lanchester linear law ancient war model,

\[ b(B_o - B) = a(R_o - R) \]  

(5)

If \( p-q = 1 \) so that \( m = p+q+1 = 1+1 = 2 \), we obtain eqn (6), the Lanchester square law for modern warfare

\[ b \left( B_o^2 - B^2 \right) = a \left( R_o^2 - R^2 \right) \]  

(6)

If \( p-q = -1 \) so that \( m = p+q+1 = -1+1 = 0 \), we obtain from eqn (3) that \( bB^{-1} = aR^{-1} \) or \( b \frac{dB}{B} = a \frac{dR}{R} \) which yields, on integration, eqn (7), the Lanchester logarithmic law war model.

\[ \ln \left( \frac{B}{B_o} \right) = a \ln \left( \frac{R}{R_o} \right) \]  

(7)

Note that for conventional warfare \( p>0 \) and/or \( q>0 \), and for guerrilla warfare \( p<0 \) and/or \( q<0 \).

Curve-Fitting Lanchester/Osipov Generalized War Models using Multiple Regressions

The generalized Lanchester/Osipov war models are given as:
\[ R = bB^pR^q \]  
\[ B = bR^pB^q \]

Dividing (1) by (2) we have,

\[ \frac{R}{B} = b (\frac{B}{R})^{p-q} \]

Taking log of both sides in equation (8) we have

\[ \ln \left( \frac{R}{B} \right) = \ln b - \ln a + (p - q) \ln B - (p - q) \ln R \]

or \[ Y_1 = f_2 - f_1 - (p - q) X_1 \]  
\[ \text{(i)} \]

or \[ Y_1 = K_1 - \alpha_1 X_1 \]  
\[ \text{(ii)} \]

Multiplying (i) by (ii) we have;

\[ \tilde{R}\tilde{B} = ab(RB)^{p+q} \]

Taking log of both sides of equation (9) we obtain

\[ \ln (\tilde{R}\tilde{B}) = \ln a + \ln b + (p + q) \ln (RB) \]

or \[ Y_2 + f_1 - f_2 + (p + q) X_2 \]  
\[ \text{(iii)} \]

or \[ Y_2 = K_2 + \alpha_2 X_2 \]  
\[ \text{(iv)} \]

Applying least square method to solve equation (ii) we have

\[ S = \sum (Y_1 - K_1 - \alpha_1 X_1)^2 \]

Which yields (v) and (vi)

\[ \sum Y_1 - nK_1 - \alpha_1 \sum X_1 = 0 \]  
\[ \text{(v)} \]

\[ \sum Y_1 X_1 - K_1 \sum X_1 - \alpha_1 \sum X_1^2 = 0 \]  
\[ \text{(vi)} \]

Similarly applying the least square method in equation (iv), we have

\[ S = \sum (Y_2 - K_2 - \alpha_2 X_2)^2 \]

Which yields (vii) and (viii)

\[ \sum Y_2 - nK_2 - \alpha_2 \sum X_2 = 0 \]  
\[ \text{(vii)} \]

\[ \sum Y_2 X_2 - K_2 \sum X_2 - \alpha_2 \sum X_2^2 = 0 \]  
\[ \text{(viii)} \]

Use the values

\[ \sum Y_1, \sum X_2, \sum Y_1 X_1, \sum Y_2 X_2, \sum X_2^2, \text{and \sum X}_1^2 \]

gotten from Table 2.

Substituting the values for the variables and solving equations (v) and (vi) simultaneously.

\[ -10.4289 - 9K_1 + 10.4289 \alpha_1 = 0 \]  
\[ \text{(v)} \]

\[ -12.72306 + 10.4289K_1 - 12.72306 \alpha_1 = \text{……..} \]  
\[ \text{(vi)} \]

or \[ K_1 = 0 \text{ and } \alpha_1 = 1 \]

Similarly substituting the values of the variables and solving simultaneously equations (vii) and (viii)

\[ 160.5732 - 9K_2 - 186.1768 \alpha_2 = 0 \]  
\[ \text{(vii)} \]

\[ 3346.34 - 185.1768K_2 - 3882.776 \alpha_2 = 0 \]  
\[ \text{(viii)} \]

or \[ K_2 = 1.56 \text{ and } \alpha_2 = 0.784 \]

so that from the correlation table 3

\[ q = -0.108 \text{ and } p = 0.892 \]

\[ f_2 = f_1 = 0.78025 \]

\[ \alpha = 0.78025 = 2.1820 \]

Since \[ f_1 = f_2 = 0.7802 \text{ hence } \alpha = b = 2.1820 \]
Having obtained the values for a, b, p and q, substitute into the equations (1) and (2) to obtain the model for the Iraqi and Iranian warfare respectively.

\[ R = 2.182B^{0.892}R^{-0.108} \]  
\[ B = 2.182R^{0.892}B^{-0.108} \]

From equation (4)

\[ B^m = B_o^m - \frac{a}{b} \left( R_o^m - R^m \right) \]

Since \( m = p - q + 1 = 0.892 + 0.108 + 1 = 2 \) (Square law of modern warfare).

So that from eqn (4)

\[ R^2 = R_o^2 - B_o^2 + B^2 \]  
\[ \sum Y_1 = \ln(R/B) \]

Table 1: Regression Analysis Table

| \( T(\text{years}) \) | \( R \) | \( B \) | \( \hat{R} \) | \( \hat{B} \) | \( \hat{R}/\hat{B} \) | \( \hat{R}\hat{B} \) | \( \hat{B}\hat{R} \) | \( R/B \) | \( Y_1 = \ln(R/B) \) | \( Y_2 = \ln(RB) \) | \( X_1 = \ln(R/B) \) | \( X_2 = \ln(RB) \) | \( Y_1X_1 \) | \( Y_2X_2 \) | \( X_1^2 \) | \( X_2^2 \) |
|----------------|-------|-------|-------|-------|--------|--------|--------|-------|-----------------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 0               | 0     | 0     | 0     | 0     | 0      | 0      | 0      | 0     | -1.25351        | 18.55346        | -0.4055     | -0.4055     | -1.25351    | -1.25351    | -1.25351    | -1.25351    | -1.25351    | -1.25351    |
| 1               | 5710  | 20000 | 5710  | 20000 | 0.2855 | 1E+08  | 1E+08  | 0.2855 | -1.25351        | 18.55346        | -0.4055     | -0.4055     | -1.25351    | -1.25351    | -1.25351    | -1.25351    | -1.25351    | -1.25351    |
| 2               | 17150 | 60000 | 8575  | 30000 | 0.2858 | 3E+08  | 1E+09  | 0.2858 | -1.2523         | 18.55346        | -0.4055     | -0.4055     | -1.2523     | -1.2523     | -1.2523     | -1.2523     | -1.2523     | -1.2523     |
| 3               | 5713  | 20000 | 1904.3| 6666.7| 0.2857 | 1E+07  | 1E+08  | 0.2857 | -1.2523         | 18.55346        | -0.4055     | -0.4055     | -1.2523     | -1.2523     | -1.2523     | -1.2523     | -1.2523     | -1.2523     |
| 4               | 28570 | 100000| 7142.5| 25000 | 0.2857 | 2E+08  | 3E+09  | 0.2857 | -1.2528         | 18.55346        | -0.4055     | -0.4055     | -1.2528     | -1.2528     | -1.2528     | -1.2528     | -1.2528     | -1.2528     |
| 5               | 85720 | 300000| 17144 | 60000 | 0.2857 | 1E+09  | 3E+10  | 0.2857 | -1.2527         | 18.55346        | -0.4055     | -0.4055     | -1.2527     | -1.2527     | -1.2527     | -1.2527     | -1.2527     | -1.2527     |
| 6               | 54280 | 190000| 9046.7| 31667 | 0.2258 | 3E+08  | 1E+10  | 0.2857 | -1.2529         | 18.55346        | -0.4055     | -0.4055     | -1.2529     | -1.2529     | -1.2529     | -1.2529     | -1.2529     | -1.2529     |
| 7               | 17150 | 60000 | 2450  | 8571.4| 0.2858 | 2E+07  | 1E+09  | 0.2858 | -1.2523         | 18.55346        | -0.4055     | -0.4055     | -1.2523     | -1.2523     | -1.2523     | -1.2523     | -1.2523     | -1.2523     |
| 8               | 5708  | 20000 | 713.5 | 2500  | 0.2854 | 2E+06  | 1E+08  | 0.2854 | -1.2539         | 18.55346        | -0.4055     | -0.4055     | -1.2539     | -1.2539     | -1.2539     | -1.2539     | -1.2539     | -1.2539     |
| 9               | 20000 | 30000 | 2222.2| 3333.3| 0.6667 | 7E+06  | 6E+08  | 0.6667 | -1.2535         | 18.55346        | -0.4055     | -0.4055     | -1.2535     | -1.2535     | -1.2535     | -1.2535     | -1.2535     | -1.2535     |
| \( \sum \)     | 0     | 0     | 0     | 0     | 0      | 0      | 0      | 0      | 0.2855          | 18.55346        | -0.4055     | -0.4055     | -1.2535     | -1.2535     | -1.2535     | -1.2535     | -1.2535     | -1.2535     | -10.429
Table 2: Nomenclature and Correlation between the parameters used

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\dot{B}(t)$</td>
<td>$\alpha_1 = p - q$</td>
</tr>
<tr>
<td>$\dot{R}(t)$</td>
<td>$\alpha_2 = p + q$</td>
</tr>
<tr>
<td>$B(t)$</td>
<td>$K_1 = f_2 - f_1$</td>
</tr>
<tr>
<td>$R(t)$</td>
<td>$K_2 = f_1 - f_2$</td>
</tr>
<tr>
<td>$f_1$</td>
<td>$f_1 = \ln a$</td>
</tr>
<tr>
<td>$f_2$</td>
<td>$f_2 = \ln b$</td>
</tr>
<tr>
<td>$X_1$</td>
<td>$X_1 = \ln \left( \frac{R}{B} \right)$</td>
</tr>
<tr>
<td>$X_2$</td>
<td>$X_2 = \ln RB$</td>
</tr>
<tr>
<td>$Y_1$</td>
<td>$Y_1 = \ln \left( \frac{R}{B} \right)$</td>
</tr>
<tr>
<td>$\alpha_2$</td>
<td>$\alpha_2 = P + q$</td>
</tr>
<tr>
<td>$\nu$</td>
<td>$\nu = 1 - \eta$</td>
</tr>
<tr>
<td>$m$</td>
<td>$m = 2p + \nu = p-q+1$</td>
</tr>
</tbody>
</table>

3D Solution of Lanchester/Osipov Generalized War Model Equations Using the Product of the Two Forces

\[
\dot{R} = bB^n R^q - 1 \\
\dot{B} = aR^n B^q - 2
\]

Multiplying the rates of casualties from both sides, we have;

\[
\dot{R} \dot{B} = ab(RB)^{p+q} = a b (R B)^n \text{ i.e. } n = p + q
\]

Or

\[
\frac{dR}{dt} \frac{dB}{dt} = a b R^n B^q
\]

Taking double integration

\[
\int \int \frac{dR}{R^n} \frac{dB}{B^n} = a b \int \int dt \ dt
\]

Solving the integration of red (R) force;

\[
\int \frac{dB}{B^n} = K_1 R^{n-1} B^{n} - K_2 R^n B^{n-1}
\]

Solving the integration of blue (B) force;

\[
\int \frac{dR}{R^n} = \frac{R_o^{1-n} - R_1^{1-n}}{1-n}
\]

Plotting the model eqn (10) with MATLAB toolbox shows a misfit if the parameters $a = b$. But if $C = \frac{b}{a}$, a good fit of $R^2 = 0.9981$ is obtained (Fig. 1 and Table 4).
Fig 2: No of Iranian and Iraqi casualties versus No of Iranian casualty

Fig 3: Cumulative number of Iranian casualty due to Iraqi chemical weapon against time

Table 3: Coefficient and goodness of fit for equation 10

<table>
<thead>
<tr>
<th>Coefficient (with 95% confidence bounds)</th>
<th>Goodness of fit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_0 = 2962 (-4.14 e+010, 4.146 e+010)$</td>
<td>$SSE = 9.331 e+016$</td>
</tr>
<tr>
<td>$R_0 = 6484 (-1.535 e+009, 1.535 e+009)$</td>
<td>$R^2 = 0.9981$</td>
</tr>
<tr>
<td>$c = 0.08104 (0.07714, 0.08494)$</td>
<td>$R-Adj = 0.9975$</td>
</tr>
<tr>
<td>$RMSE = 1.155 e+008$</td>
<td>$F(X) = R_0^2 - cB_0^2 + cX^2$. where $F(X) = R^2 = Q$</td>
</tr>
</tbody>
</table>

F(X) = R_0^2 - cB_0^2 + cX^2. where F(X) = R^2 = Q

Hence, $a \neq b$ (as calculated) but $b = ca$. This will affect $f_1, f_2$, $k_1$ and $k_2$ but not $p, q, \alpha_1, \alpha_2$ and $m$. Values, so that

$\dot{R} = 0.1768 B^{0.8927} R^{0.1073}$

(1)

$\dot{B} = 2.1820 R^{0.8927} B^{0.1073}$

(2)

Table 4: Recomputed Model Casualty Values

<table>
<thead>
<tr>
<th>$B$</th>
<th>$f \left( X \right) = Q = R^2$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>41,335,300</td>
<td>6,429.25</td>
</tr>
<tr>
<td>30,000</td>
<td>114,271,000</td>
<td>10,689.76</td>
</tr>
<tr>
<td>60,000</td>
<td>333,079,000</td>
<td>18,250.45</td>
</tr>
<tr>
<td>90,000</td>
<td>697,758,000</td>
<td>26,415.11</td>
</tr>
<tr>
<td>120,000</td>
<td>1,208,310,000</td>
<td>34,760.75</td>
</tr>
<tr>
<td>150,000</td>
<td>1,864,730,000</td>
<td>43,182.52</td>
</tr>
<tr>
<td>180,000</td>
<td>2,667,030,000</td>
<td>51,643.30</td>
</tr>
<tr>
<td>210,000</td>
<td>3,615,190,000</td>
<td>60,126.45</td>
</tr>
<tr>
<td>240,000</td>
<td>4,709,230,000</td>
<td>68,623.83</td>
</tr>
<tr>
<td>270,000</td>
<td>5,949,140,000</td>
<td>77,130.67</td>
</tr>
<tr>
<td>300,000</td>
<td>7,334,920,000</td>
<td>85,644.15</td>
</tr>
</tbody>
</table>

If $v = 1 - p - q = 1 - 0.892 + 0.108 = 0.216$ and from table 4, since $a = 2.182$, $b = ca = 0.08104 (2.182) = 0.1768$, $B_0 = 2962$, $R_0 = 6484$

Eqn(11) becomes $0.01813t^2 = (5.622 - B^{0.216}) (6.658 - R^{0.216}) \ldots (11)$

Fig. 2 is the raw data plot of the number of losses (casualty versus time for both Iran (B) and Iraq (R)).

III. DISCUSSION

The tables containing the raw data with which the above plots were done are Tables 6 and 7. The Iran – Iraq war was clearly obeying the Lanchester/Osipov square law modern warfare ($m = 2$). And when the raw data was plotted with the square law (Fig. 1), it fitted to a degree of $R^2 = 0.9981$ and declared initial commitment of troops from both sides: Iraq (Red) = 6484 and Iran (Blue) = 2962. However, Iraq attacked first with 6430 soldiers before Iran’s commitment of troops into the war (Table 5) proper. The offensive of Iraq ($a = 2.182$) and the defensive of Iran ($b = 0.1768$) were not equal initially, though the war seemed to balance $b$ save the higher sacrifice (casualty) of Iran, due to Iraqi heavy use of chemical weapons (Fig.3).
The war was a mixed one with guerrilla style of 10.8% (q = -0.108) and conventional style of 89.2% (p = 0.892). This is real since the desert has few places for hiding except trenches etc. (characteristic of guerrilla warfare).

From Fig. 2 it is, also, noticed that there was more Iranian casualty than Iraqi casualty. The peak casualty of Iraq was about 85000 while that of Iran was about 300000. There is a similarity between the two curves in that the casualty variation with time follows the same trend.

Fig. 3 was done to show the drastic effect of chemical weapons in warfare. After 500 days into the war the increase of casualty surged high signifying great casualty response to the chemical weapons used by the Iraqi troops. Each surging up signifies a new drop of lethal chemical weapons. Within 0–500 days into the war, the Iranian casualty changes with time echelon-wise. At 500 days, 1400 days, 2250 days there were steep increases in the number of Iranian casualty probably as a result of the adverse effect of chemical weapons used against them.

IV. CONCLUSION

After series of calculations, curve-fittings, and data analysis the following conclusions can be drawn:

- The Lanchester square model fits the Iraq-Iran war data having an R-square value of 0.9981 which signifies a good fit.
- The attrition parameters of the two forces are not equal i.e. $a \neq b$, showing unequal fire power (Iraqi NBC weaponry could have weakened the Iranian fire power).
- From the regression computations it is observed that the ware-type parameter is negative i.e. $q = -0.108$, this implies that the war was guerrilla in nature, and, also, the war-type parameter is positive i.e. $p = 0.892$ signifying conventional warfare. We could conclude that the war was mixed one having approximately 10.8% guerrilla and 89.2% conventional nature.
- The war is heavily marred with excessive use of chemical warfare agents by the Iraqi on the Iranian troops as depicted by Fig. 3.
- Initial commitment of troops were Iraq ($B_0$) = 46484, Iran ($B_{0}$) = 2962. Also, Iraq attack Iran first with 6430 soldiers when Iran has not yet committed troops to the war, thus, proving the claim by Iran that Iraq forced the war on her (Iran).

V. RECOMMENDATIONS

The following are the recommendations to operational research departments and the military.

- There should be a stronger campaign on the disarmament of nuclear, biological and chemical (NBC) weapons since their use can obliterate a nation completely.

REFERENCES


AUTHOR BIOGRAPHY

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Obijaka J. C. holds a Masters Degree from the Department of Chemical Engineering in Federal University of Technology, Owerri, Nigeria. He also has his Bachelor’s degrees in Chemical Engineering from same institution, and has great teaching skills.

APPENDIX (Referred Tables)

Table 5: Iraq-Iran War Death Data (extracted from graph based on the assumption that for every Iraqi casualty there were $3\frac{1}{2}$ Iranians)

<table>
<thead>
<tr>
<th>Year</th>
<th>Time(t)</th>
<th>Iran Annual Death (B)</th>
<th>Iraq Annual Death (R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1979</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1980</td>
<td>1</td>
<td>20000</td>
<td>5710</td>
</tr>
<tr>
<td>1981</td>
<td>2</td>
<td>60000</td>
<td>17150</td>
</tr>
<tr>
<td>1982</td>
<td>3</td>
<td>20000</td>
<td>5713</td>
</tr>
<tr>
<td>1983</td>
<td>4</td>
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<tr>
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<td>190000</td>
<td>54280</td>
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<td>60000</td>
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<tr>
<td>1987</td>
<td>8</td>
<td>20000</td>
<td>5708</td>
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</table>

Table 6: Deaths and Casualty Data of Iran Troops as a result of Chemical and Biological Weapons used by Iraqi Troops (extracted from graph)

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Date</th>
<th>Days</th>
<th>Death</th>
<th>Casualty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>22/9/1980</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.</td>
<td>27/10/1982</td>
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<td>4</td>
<td>68</td>
</tr>
<tr>
<td>3.</td>
<td>15/8/1983</td>
<td>293</td>
<td>19</td>
<td>318</td>
</tr>
<tr>
<td>4.</td>
<td>9/11/1983</td>
<td>86</td>
<td>4</td>
<td>70</td>
</tr>
<tr>
<td>5.</td>
<td>1/3/1984</td>
<td>113</td>
<td>1200</td>
<td>5000</td>
</tr>
<tr>
<td>6.</td>
<td>17/3/1984</td>
<td>16</td>
<td>23</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Value 1</td>
<td>Value 2</td>
<td>Value 3</td>
</tr>
<tr>
<td>---</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
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<tr>
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<td>60</td>
<td>4000</td>
</tr>
</tbody>
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