Most of the formulaes come from the previous formulations.

Let the location of earth be $(1, \theta_1)$ and $(1, \theta_2)$ and (r, δ) be position of mars, then

we have $x - r\sin\theta_1 = \tan\alpha_1(y - r\cos\theta_1)$

$y - r\sin\theta_2 = \tan\alpha_2(y - r\cos\theta_2)$.

Now solving these equations

we get $x = ((-1/\text{den}) * (\sin(\theta_1) - (\tan\alpha_1 * \cos\theta_1))) +$

$((1/\text{den}) * \sin(\theta_2) - (\tan\alpha_2 * \cos\theta_2))$

$\text{den} = \tan\alpha_1 - \tan\alpha_2$

$y = ((-\tan\alpha_2 / \text{den}) * (\sin(\theta_1) - (\tan\alpha_1 * \cos(\theta_1))) +$

$(\tan\alpha_1 / \text{den}) * (\sin(\theta_2) - (\tan\alpha_2 * \cos\theta_2))$

Now $r = \sqrt{x^2 + y^2}$ and $\phi = \tan^{-1}\frac{y}{x}$.

★ All value of loss and parameters are mentioned in the code as comments.

we get 5 different locations of mars.

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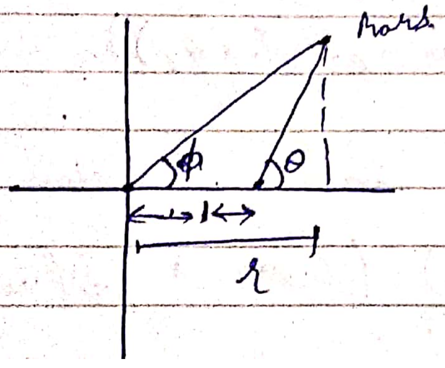
We can use the Concept from Gauss-Newton Approach for developing iterative algorithm.

$$x_{K+1} = x_K - \frac{\text{Learning Rate}}{C} (Z^T Z)^{-1} f'(x_K)$$

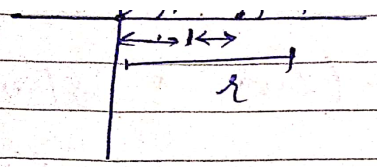
Z :- first order derivative of the function

f' :- loss incurred.

x_K :- value at K^{th} iteration.



$$\phi = \tan^{-1}\left(\frac{r - r\tan\theta}{r}\right)$$



Equation of the plane: $ax + by + cz = 0$

loss function is equal to $\left(\frac{ax + by + cz}{\sqrt{a^2 + b^2 + c^2}} \right)^2$

(iv) loss function used is, we try to minimize the sum of distance of a point from each foci for all the points subtracted from the length of the major axis because of the property of ellipse.