Data Analytics
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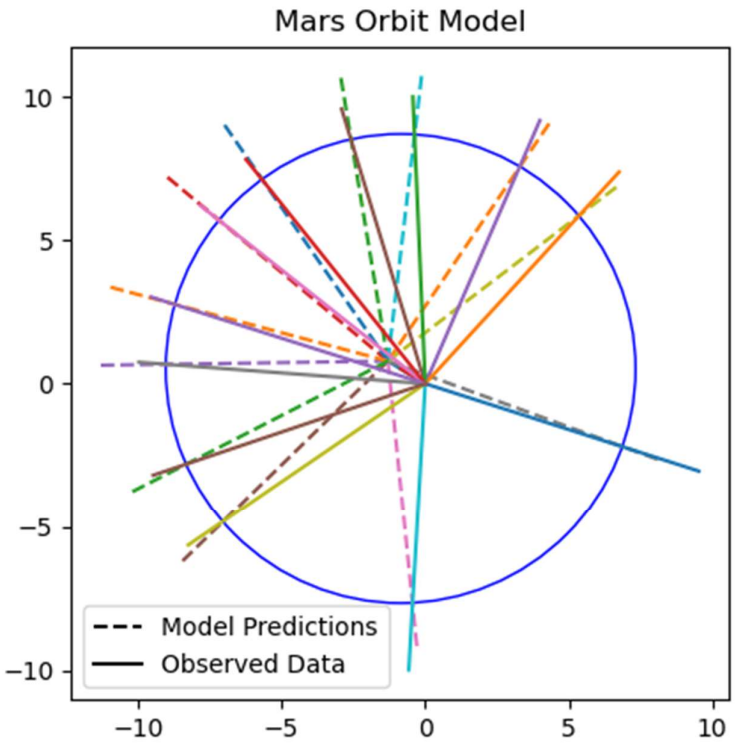
Output:

Parameter	Value	Unit
C	149.0611974710125	degree
E1	1.6235464744913284	AU
E2	148.9722904982998	Degree
Z	55.83807164153505	Degree
S	0.5240814342248907	Degree per Day
R	8.732190304526338	AU

Errors in Degree - [0.02798342, 0.02160305, 0.02798612, 0.00071965, -0.0279935, 0.02799353, -0.00138272, 0.02799138, 0.0175719, 0.01161228, 0.02799351, 0.0001218] in degs

MaxError = 0.02799352601003222 in degs or 1.6796 Minutes

Plot using optimized data:



Implementation Summary:

MarsEquantModel – Referring to assumptions mentioned in Question paper of Assignment 2. The following equations are solved.

A circle drawn from mars orbit centre, the eq. is as follows:

$$(x - c_X)^2 + \left(y - c_y\right)^2 = r^2$$

A line passing through equant centre and making z' angel from Aries lines:

$$(y - ey) = (x - ex)\tan(z')$$

$$z' = (z + s * T)$$

Solving above equation will result in (x1, y1) and (x2, y2):

The intersection point (circle and line) near to opposition is chosen to calculate the errors.

bestOrbitInnerParams – Given R and S, started with initial guess of c, e1, e2, z and optimized c, e1, e2, z as single parameter one by one. (see code : class **SingleOptimizer**) This process is repeat 20 times.

Then all 4 parameters are optimized together. (see code: class **InternalOpti**)

bestS – Given R, S is initialized near 2*pi /687 and bound within +- 2% range. The internal mechanism uses the same above function **bestOrbitInnerParams**.

bestR – Optimized S from above other parameter is used are initialization. The R is calculated. The internal mechanism uses the same above function **bestOrbitInnerParams**.

bestMarsOrbitParams – All above functions **bestOrbitInnerParams, bestS, bestR** wrapped in this function to finally calculate final best params.

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