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New Data Prediction Algorithm

HJ Jayatheertha

EECE Department
GITAM School of Technology
Bengaluru, India

***Corresponding author:** hj.jayatheertha@gmail.com

Abstract

A new data prediction algorithm is given using Fourier series. Octave coding is given to predict the data element. It is giving exact data prediction.

Keywords: Fourier series, data prediction algorithm, octave coding

1. Introduction

Literature review of data prediction shows linear regression of sample data points. But linear regression may not work if the data is purely random in nature. The following section gives data prediction algorithm using Fourier series.

2. Octave Code

```
Data from ref[1]
clear all; close all; clc
temp=1
for i=0:300/30000:300
  x=i;
y(temp,1) =(2.3909/2)-0.27091*cos(x)+0.39636*cos(2*x)-0.11273*cos(3*x) ...
-0.50182*sin(x)+0.063636*sin(2*x) +0.45636*sin(3*x);
temp=temp+1;
end
size(y)
k=30001;
temp2=0;
x= [0:0.01:300]';
  size(x);
for j=300:300/30000:330
  j;
         a1=(2/(30001+temp2)) *sum(y.*cos(x));
  a2=(2/(30001+temp2)) *sum(y.*cos(2*x));
    a3=(2/(30001+temp2)) *sum(y.*cos(3*x));
  a4=(2/(30001+temp2)) *sum(y.*cos(4*x));
b1=(2/(30001+temp2)) *sum(y.*sin(x));
    b2=(2/(30001+temp2)) *sum(y.*sin(2*x));
  b3=(2/(30001+temp2)) *sum(y.*sin(3*x));
  b4=(2/(30001+temp2)) *sum(y.*sin(4*x));

  temp2=temp2+1;
  m=-a1*sin(j)-a2*sin(2*j)-a3*sin(3*j)-a4*sin(4*j) +b1*cos(j)+b2*cos(2*j) ...
```

```
+b3*cos(3*j) +b4*cos(4*j);
acce=-a1*cos(j)-2*a2*cos(2*j)-3*a3*cos(3*j)-4*a4*cos(4*j)-b1*sin(j)...
-2*b2*sin(2*j)-3*b3*sin(3*j)-4*b4*sin(4*j);
  if m < 0 && acce < 0
  m=m; end
 if m < 0 && acce> 0
  m= -m; end
if m > 0 && acce< 0
  m= -m; end
if m>0 && acce>0
m=m; end
  ynew=y(k,1) +(m*(300/30000));
k=k+1;
  x= [x (:,1) ;(x (30001,1) +0.01)];
  size(x);
y= [y; ynew];
end
y (33001,1)
```

3. Algorithm

Step1: read the data input
Example read x=0, 30,60,90,120,150,180,210,240,300
Corresponding y values.
Step2: find the Fourier series coefficients of the step1 data.
Step3: make more samples of the x, y. that is substituting x=0 to 300 in steps of 0.01. This will get 30,000 samples of input data x, y.
Step4. Y samples are calculated from step2 equation.
Step5: from x=300 to 330, data is predicted using slope and acceleration of the curve from 0 to 300 degrees.
Step6: if the slope m of data curve at present x is positive and acceleration of the curve is positive
y2=y1+ m*(0.01)
if the slope m of data curve at present x is positive and acceleration of the curve is negative
Then new y for x increment of 0.01= y2=y1- m*(0.01)
if the slope m of data curve at present x is negative and acceleration of the curve is positive
Then new y for x increment of 0.01=y2=y1 -m*(0.01)
if the slope m of data curve at present x is negative and acceleration of the curve is negative
Then new y for x increment of 0.01=y2=y1+ m*(0.01)
Step7: Data predicted at every interval of 0.01 x, is added to previous data curve point.
Step8: step5,6 and step7 are repeated until x=330
Step9: end

4. Data Visual

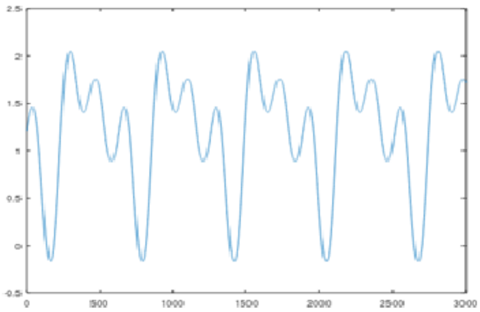

FIG.01 INPUT DATA VS INPUT SAMPLE FROM 0 TO 30 DEGREES

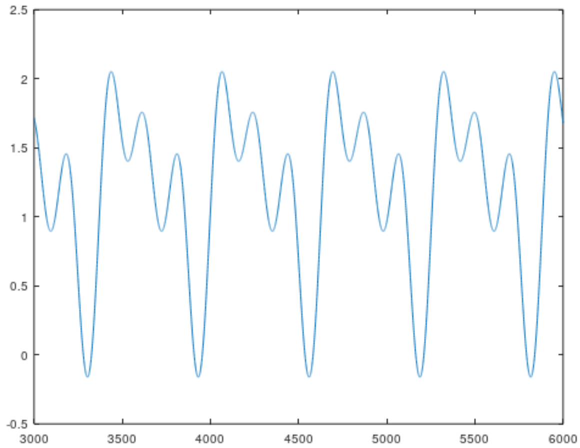

FIG2: INPUT DATA VS INPUT SAMPLE FRO 30 DEGREES TO 60 DEGREES

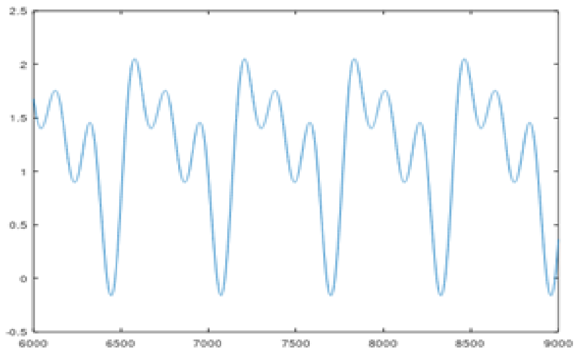

FIGURE3: INPUT DATA VERSES INPUT SAMPLE FROM 60 DEGREES TO 90 DEGREES

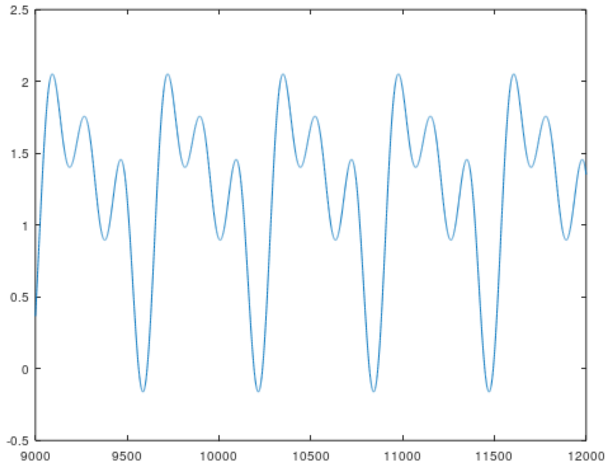

FIGURE4: INPUT DATA VERSES INPUT SAMPLE FRO 90 DEGREES TO 120 DEGREES

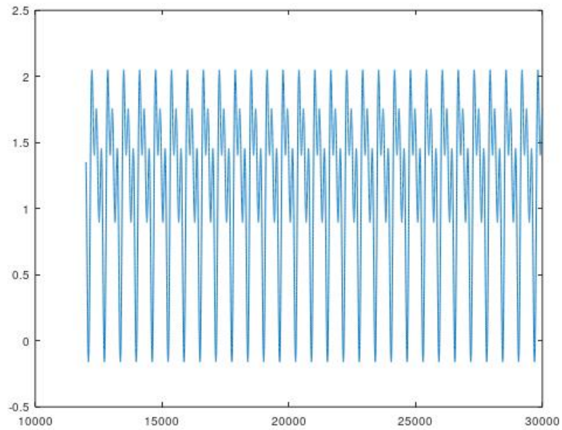

FIGURE 5:INPUT DATA VS INPUT SAMPLE FROM 120 DEGREES TO 300 DEGREES

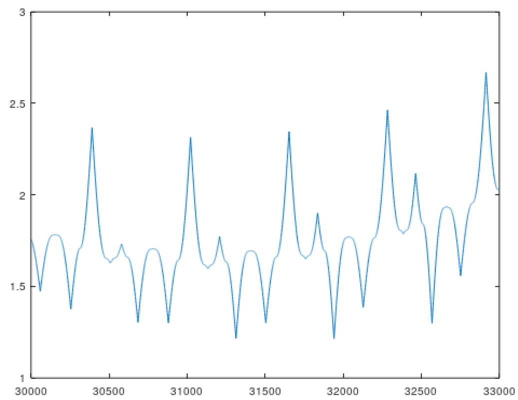

FIGURE 6: PREDICTED DATA VERSES SAMPLE FROM 300 DEGREES TO 330 DEGREES

5. Conclusion

The data is given in the intervals of 30 degrees from 0 degrees to 330 degrees. It is assumed that 330-degree data is not given and the Fourier series equation is calculated from 0 to 300 degrees. Finally, 330-degree data is predicted.[1]

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