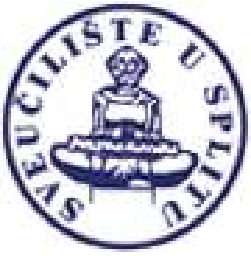


SVEUČILIŠTE U SPLITU

FAKULTET ELEKTROTEHNIKE, STROJARSTVA I BRODOGRADNJE

NUMERIČKA ANALIZA

Domaći rad 2

Interpolacijski kubični splajn

Tomislav Tokić

ZADATAK:

Napišite program za računanje koeficijenata prirodnog kubičnog splajna i izvrednjavanje tog splajna u Matlabu (ili Octave). Pomoću programa interpolirajte funkciju koju ćete sami zadati u 6 točaka i 7 točaka. Nacrtajte sliku na kojoj se vidi funkcija, splajn i odabrane točke. Napišite izvještaj u kojem se nalazi program i rezultati izvođenja te ga predajte preko portala. Koristite pdf format.

RJEŠENJE:

Za interpolaciju od 7 točaka programski kod :

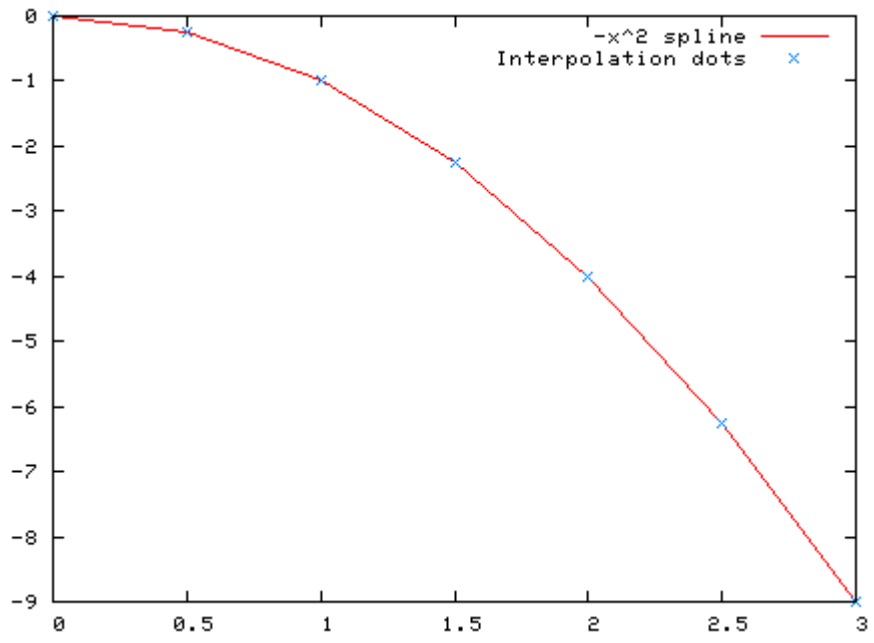
```
x = [0 0.5 1 1.5 2 2.5 3];
y = -x.^2;
i = 1: (length(x)-1);
h = x(i+1) - x(i);
temp1 = y(i+1) - y(i);
temp2 = x(i+1) - x(i);
d = temp1./temp2;
h
H(1,1) = 2*( h(1) + h(2));
H(1,2) = h(2);
H(2,1) = h(1);
for i = 1:length(h) -1
for j = 1:length(h) -1
if  ( (i ==j) & (i!=1) & (j!=1))
H(i,j) =2*( h(i) + h(i+1));
endif
if (  ( (j-i) == 1) & i>1)
H(i,j) = h(i+1);
endif
if (  ( (i-j) == 1) & j>1)
H(i,j) = h(i);
endif
endfor
endfor
```

```
i = 1:length(d)-1;
f = 6* (d(i+1) - d(i));
temp= inv(H) *f';
temp = temp';
s(1) = 0;
i = 1: length(temp);
s(i+1) = temp(i);
s( length(s) +1) = 0;
i = 1:length(d);
b = d(i) - ( s(i+1) - s(i)).* (h(i)/6);
counter = 0;
for j = 0:0.5:3
if ( j<=0.5)
temp1 =y(1) - ( (h(1)^2) * s(1))/6;
temp2 = b(1) * (j - x(1));
temp3 = (s(1) / (6*h(1))) * (x(2)-j)^3;
temp4 = (s(2) / (6*h(1))) * (j - x(1))^3;
endif
if ( j>=0.5 & j<=1)
temp1 =y(2) - ( (h(2)^2) * s(2))/6;
temp2 = b(2) * (j - x(2));
temp3 = (s(2) / (6*h(2))) * (x(3)-j)^3;
temp4 = (s(3) / (6*h(2))) * (j - x(2))^3;
endif
```

```
if ( j>=1 & j<=1.5)
temp1 = y(3) - ((h(3)^2) * s(3))/6;
temp2 = b(3) * (j - x(3));
temp3 = (s(3) / (6*h(3))) * (x(4)-j)^3;
temp4 = (s(4) / (6*h(3))) * (j - x(3))^3;
endif

if ( j>=1.5 & j<=2)
temp1 = y(4) - ((h(4)^2) * s(4))/6;
temp2 = b(4) * (j - x(4));
temp3 = (s(4) / (6*h(4))) * (x(5)-j)^3;
temp4 = (s(5) / (6*h(4))) * (j - x(4))^3;
endif

if ( j>=2 & j<=2.5)
temp1 = y(5) - ((h(5)^2) * s(5))/6;
temp2 = b(5) * (j - x(5));
temp3 = (s(5) / (6*h(5))) * (x(6)-j)^3;
temp4 = (s(6) / (6*h(5))) * (j - x(5))^3;
endif
```

```
if ( j>=2.5 & j<=3)
temp1 = y(6) - ((h(6)^2) * s(6))/6;
temp2 = b(6) * (j - x(6));
temp3 = (s(6) / (6*h(6))) * (x(7)-j)^3;
temp4 = (s(7) / (6*h(6))) * (j - x(6))^3;
endif

counter = counter+1;
sum(counter)= temp1+temp2+temp3+temp4;
endfor
j=0:0.5:3plot(j,sum,"-;-x^2spline;",j,j.^2,"+3;Interpolation dots;");
```

Dijagram:



Korišten je : (-X^2) interpolacijski polinom

Za interpolaciju od 6 točaka programski kod :

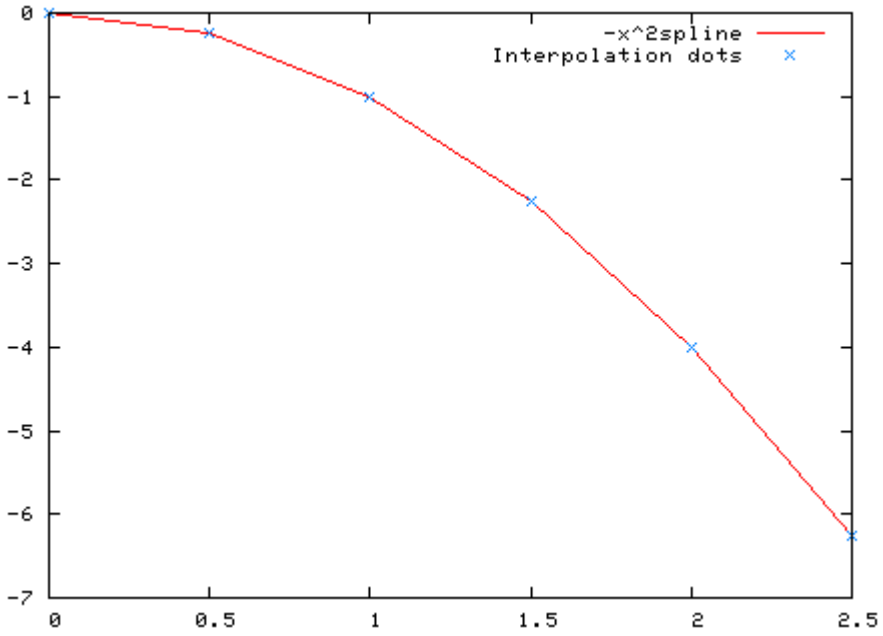
```
x = [0 0.5 1 1.5 2 2.5];
y = -x.^2;
i = 1: (length(x)-1);
h = x(i+1) - x(i);
temp1 = y(i+1) - y(i);
temp2 = x(i+1) - x(i);
d = temp1./temp2;
h
H(1,1) = 2*( h(1) + h(2));
H(1,2) = h(2);
H(2,1) = h(1);
for i = 1:length(h) -1
for j = 1:length(h) -1
if  ( (i ==j) & (i!=1) & (j!=1))
H(i,j) =2*( h(i) + h(i+1));
endif
if (  ( (j-i) == 1) & i>1)
H(i,j) = h(i+1);
endif
if (  ( (i-j) == 1) & j>1)
H(i,j) = h(i);
endif
endfor
endfor
```

```
i = 1:length(d)-1;
f = 6* (d(i+1) - d(i));
temp= inv(H) *f';
temp = temp';
s(1) = 0;
i = 1: length(temp);
s(i+1) = temp(i);
s( length(s) +1) = 0;
i = 1:length(d);
b = d(i) - ( s(i+1) - s(i)).* (h(i)/6);
counter = 0;
for j = 0:0.5:2.5
if ( j<=0.5)
temp1 =y(1) - ( (h(1)^2) * s(1))/6;
temp2 = b(1) * (j - x(1));
temp3 = (s(1) / (6*h(1))) * (x(2)-j)^3;
temp4 = (s(2) / (6*h(1))) * (j - x(1))^3;
endif
if ( j>=0.5 & j<=1)
temp1 =y(2) - ( (h(2)^2) * s(2))/6;
temp2 = b(2) * (j - x(2));
temp3 = (s(2) / (6*h(2))) * (x(3)-j)^3;
temp4 = (s(3) / (6*h(2))) * (j - x(2))^3;
endif
```

```
if ( j>=1 & j<=1.5)
temp1 = y(3) - ((h(3)^2) * s(3))/6;
temp2 = b(3) * (j - x(3));
temp3 = (s(3) / (6*h(3))) * (x(4)-j)^3;
temp4 = (s(4) / (6*h(3))) * (j - x(3))^3;
endif

if ( j>=1.5 & j<=2)
temp1 = y(4) - ((h(4)^2) * s(4))/6;
temp2 = b(4) * (j - x(4));
temp3 = (s(4) / (6*h(4))) * (x(5)-j)^3;
temp4 = (s(5) / (6*h(4))) * (j - x(4))^3;
endif
```

```
if ( j>=2 & j<=2.5)
temp1 = y(5) - ((h(5)^2) * s(5))/6;
temp2 = b(5) * (j - x(5));
temp3 = (s(5) / (6*h(5))) * (x(6)-j)^3;
temp4 = (s(6) / (6*h(5))) * (j - x(5))^3;
endif
counter = counter+1;
sum(counter)= temp1+temp2+temp3+temp4;
endfor
j=0:0.5:2.5
plot(j,sum,"-;- x^2spline;",j,-j.^2,"+3;Interpolation dots;");
```

Dijagram:



Korišten je : (-X^2) interpolacijski polinom