**Algorithm 1:** Newton cotes Formula

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| Method introduction: |
| When the product node is distributed at the interval of [a,b], the interpolation integral formula (first using Lagrange to interpolate the nodes, then calculating the product coefficient, and finally evaluating the integral value) is called the newton-cotes integral formula.  Since the newton-cotes integral is obtained through the variation of Lagrange polynomial interpolation, we all know that the high degree polynomial interpolation will have Runge oscillation phenomenon, which leads to the instability of the high-order newton-cotes formula.  The product coefficient of the newton-cotes integral formula is:  http://attach.matlabsky.com/data/attachment/forum/month_0911/20091120_deed19c54365ee7ee170ti5LcDTFwwJx.gif  where C(k,n) is called the cortez coefficient.  As a result of the numerical stability condition is quadrature coefficient Ak must be positive, so more than n > = 8 high-order Newton - Cotes formulas, we cannot guarantee the integral stability (the root cause is that Newton - Cotes formulas are derived from though laser interpolation amounts, and high order polynomial and Rung phenomenon will appear. |
| Algorithm Design |
| step 1: Divide the interval [a,b] n into equal parts,  Get Interpolation function,    Step 2 : Get the Quadrature formula:    In which, the quadrature coefficient, |
| Matlab code |
| function I = NewtCot(fun,a,b,npanel)  % NewtCot 用Newton-Cotes公式求积分  %  % Synopsis: I = NewtCot4Integ(fun,a,b,n)  %  % Input: fun = (string) 被积函数的函数名  % a, b = 积分下限和积分上限  % npanel = (optional) 将积分区间平分的段数  %  % Output: I = 通过Newton-Cotes公式求积分的近似值  syms t;  syms y;  Ai=zeros(npanel+1,1);  ii=0:npanel;  yy=prod(t-ii);  h = (b-a)/npanel; %步长  x = a:h:b; %将积分区间分段  f = feval(fun,x); %求节点处被积函数的值  I=0;  for i=1:npanel+1 %求科特斯系数  yi=yy/(t-i+1);  Ai(i)=(b-a)\*(-1)^(npanel-i+1)/(npanel\*factorial(i-1)\*factorial(npanel-i+1));  Ai(i)=Ai(i)\*int(yi,t,0,npanel);  end  for i=1:npanel+1 %求积分  I=I+Ai(i)\*f(i);  end  end |
| Examples and Result |
| Use N-Cotes rule *I*n=(n=2,3,4,5,6,7,8,9) to calculate , compare with exact solution …    Remarks |
| 此处写该方法程序设计的一些注意事项，也可以空白 |
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