Numerical Techniques by Ankit Kumar

Numerical analysi
numerical methods ka use karke mathematical problems ko solve karta hai

Floating point representation
number ka ek hissa value dikhata hai aur doosra hissa uske scale ko.
jisme number ka ek part mantissa aur doosra part exponent hota h
EX. 3.14 ya 0.00001

Floating point arithmetic
numbers ko decimal ke saath likha jata hai, jaise 3.14 ya 0.0001
Properties :

- **Accuracy**: Floating point numbers accurate nahi hote, kabhi kabhi result thoda galat aa sakta hai.
- **Badi Chhoti Numbers**: Yeh bahut bade ya chhote number ko handle kar sakte hain.
- **Overflow/Underflow**: Agar number bahut bada ya bahut chhota h toh represent nahi hota (overflow/underflow).
- **Rounding**: Kabhi kabhi calculation ke baad numbers ko round karna padta hai, jisse thoda mistake ho sakta h
- **Order ka Farq**: Agar calculation ka order change hota hain, toh result thoda alag aa sakta hai.

Euler's method
kisi equation ka approximate solution nikalta h,
starting value se shuru hota hain aur thoda-thoda aage badhta hain.
Step-by-step
iteration

direct method
steps ke saath ekdum exact solution nikalta hai
jaise Gauss elimination.

Runge-Kutta method
differential equations ka approximate solution nikalta h
Me 5 equation wale formule hote h
k1 se k4 tak aur y1
Step-by-step
iteration

Iteration method
same process ko repeat karke solution find karta h
step-by-step

Numerical technique
complex math problems ko asaan tareeke se solve karte hain
computer ki help se.

Extrapolation
Diye gaya data se aage ka data predict karta h

Gauss-Seidel method
equations ke solution ko dheere-dheere improve karta hain
har step mein naye values use hoti h

Simpson's 1/3 rule
function ka area nikalta h
Function k points ko 3 bar divide karke unka average lete hain, jisse approximate answer milta hai
Isme even or odd no.s lete h

Chopping
decimal ke baad ke numbers ko hata dena,

aur ***rounding*** ka matlab hai number ko uske nearest value tak badalna.

Regular falsi method
equation ka root dhundne ke liye do points ka use karta hain
aur un do points ke beech se ek naya point nikal kar root find karta h
Iteration
Step by step

Newton's Forward Method
ek interpolation technique hai
data points increasing order mein diye jaate h
data points ke beech se polynomial approximate answer nikalta h
Iteration
Step by step

Newton backward difference
ek interpolation technique hai
data points decreasing order mein diye jaate h
pichle values ka use karke function ki nayi values find karta hai.
Iteration
Step by step

Numerical analysis mein pivotal row
woh row hoti hai jo matrix mein zero banane ke liye row operations lagate h

What are the format to represent a number?
There are two format to represent a number:
Fixed Point Representation
Floating Point Representation

How to find Initial approximation to a root?
Graphically

Guess and check
Newton-Raphson
Bisection

Significant digits
number hota hain jo kisi value ko accurate represent karta h
Jese 1.20 not 1.00

Simpson's 3/8 rule
kisi curve ka area approximate karte hain
jisme hum 3 points ke intervals ka use karte hain.

Bisection
function ka root (zero) find karne ke liye
interval ko do parts mein divide kiya jata hai
har step mein interval ko reduce kiya jata hai jab tak root mil na jaye

Normalization
data ko standard format mein convert kiya jata hai

Mantissa
decimal point ke baad aata hai
mantissa ko exponent ke sath likha jata hai.

Exponent
ek mathematical term hai a ki power 2 to 2 exponent h

Base
A ki power 2 to a base h

Numerical analysis mein interpolation
Diye gaye data set ke bich ke missing values ko estimate karta hai.

Composite trapezoidal rule
ek numerical integration method hai
function ke area ko multiple trapezoids ke through approximate kiya jata hai
jisme interval ko chhote sub-intervals mein divide kiya jata h

LU decomposition
matrix ko do matrices (L aur U) mein todta hai
jahan L ek lower triangular matrix hoti hai aur U ek upper triangular matrix hoti hai

Gauss elimination method with partial pivoting
matrix ke rows ko interchange kiya jata hai
taaki largest element ko pivot banaya ja sake

Newton's method
function ka solution (root) ko dhundhne ke liye approximation karte hain

aur har step mein tangent line ka use hota hain

Secant method
equation ka root dhundne k liye approximate answer nikalta
Aur do initial approximation ke beech mein secant line ka slope ka use hota hai.
Iteration
Step by step

Central difference
kisi do number k difference se beech ka change nikalta hai.
Step by step solve hota h

Best method
bisectoinn method h root find karne k liye aur
Secand method faster h

Numerical analysis mein, average operator
numbers k beech ka value nikalta h
jo sab numbers ko jod kar unki ginti se divide karke milta hai.

Newton-Raphson method
equation ka (root) nikalta h
Iteration
Step by step

Gaussian elimination
linear equations ko step-by-step solve karke unka answer nikalta hain.

Jacobi iterative method
ek numerical technique hai
equations ko step by step solve karta hain
Aur har step mein purani values se naye values nikalte hain.
iteration

Gauss-Jacobi aur Jacobi iteration
linear equations ko step by step solve karte hain
har step mein pehle wale results ka use karke naye answers nikaalte hain.

Trapezoidal rule
curve ke neeche ka area approximate karta h
h/2(y0+yn + 2X(all numbers)

Regula Falsi
kisi equation ke root ko find karta h
do initial guesses ke beech ek linear approximation banakar solution nikaala jaata hai.
Step by step
iteration

Is Regula Falsi Method and False Position Method same?
Yes it is same