Algorithm 4: Fixed point iteration and Aitken acceleration

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| Method introduction: |
| In numerical analysis, fixed-point iteration is a method of computing fixed points of iterated functions.  More specifically, given a function *f* defined on the real numbers with real values and given a point in the domain of *f*, the fixed point iteration is    which gives rise to the sequence which is hoped to converge to a point *x*. If *f* is continuous, then one can prove that the obtained {\displaystyle x} x is a fixed point of *f*, i.e.,  More generally, the function *f* can be defined on any metric space with values in that same space. |
| Algorithm Design |
| F=@(x) …  X(1)=…;  For i=2:Maxiteration  X(i)=…%see in method introduction  end |
| Matlab code |
| function [x, y] = MySecant(fun, a0, tol, max)  % This is the code for Fixed point iteration.  % Input:  % a0 Initial guess  % fun function  % tol Allowable tolerance in successive iterates  % max Maximum number of iterations  % Output:  % x Vector of approximations to zero  % y Vector of function values, fun(x)  % Preallocate vectors.  x = zeros(max, 1);  y = zeros(max, 1);  % Set an intial interval.  x(1) = a0;;  % Secant search  for i = 1 : max  x(i+1) = fun(x(i));  if (abs(x(i+1) - x(i)) < tol)  fprintf('Secant method has converged\n');  break;  end  iter = i+1;  end  if (iter > (max+1))  fprintf('Zero not found to desired tolerance within the maximum number of iterations\n');  iter=iter-1;  end  % Output results  k = 1:iter;  fprintf(' iter x\n');  disp([k' x(1:iter) y(1:iter)]); |
| Examples and Result |
| To calculate , define  1.500000000000000  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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