

Free download Minimax approximation and remez algorithm math unipd [PDF]

the remez algorithm or remez exchange algorithm published by evgeny yakovlevich remez in 1934 is an iterative algorithm used to find simple approximations to functions specifically approximations by functions in a chebyshev space that are the best in the uniform norm 1 sense the remez algorithm is an iterative procedure which can be used to nd best polynomial approximations in the minimax sense we present and explain relevant theory on minimax approximation after doing so we state the remez algorithm and give several examples created by our matlab implementation of the algorithm we conclude by presenting a the remez algorithm remez 1934 also called the remez exchange algorithm is an application of the chebyshev alternation theorem that constructs the polynomial of best approximation to certain functions under a number of conditions the remez algorithm in effect goes a step beyond the minimax approximation algorithm to give a slightly finer remez algorithm to understand the remez exchange algorithm rst note that 7 can be written as follows let represents $c_{jj} 1$ then 7 becomes $w_i a_i d_i 1 i 8 a_i d_i i 1 w_i 9$ or $x_m k 0 a_k \cos k i 1 i w_i d_i$ for $i 1 r 10$ if the set of extremal points in the alternation theorem were $abiy tasissa$ abstract the remez exchange algorithm is explained an implementation in python is tested on di erent test functions we make a comparison with `slsqp` sequential least squares programming optimizer key words remez exchange minimax polynomial polynomial interpolation 1 overview the remez algorithm is a methodology for locating the minimax rational approximation to a function this short article gives a brief overview of the method but it should not be regarded as a thorough theoretical treatment for that you should consult your favorite textbook the second step of remez algorithm seeks a new set of $n 2$ points that approach the $n 2$ points of the minimax condition the second step is called the exchange step there are two exchange techniques in the first exchange technique we exchange a single point in the current set of $n 2$ points to get a new set of points while in the second the remez algorithm 75 years old is a famous method for computing minimax polynomial approximations most implementations of this algorithm date to an era when tractable degrees were in the dozens whereas today degrees of hun dreds or thousands are not a problem remez algorithm let $\phi_i i 0 1$ dots n be a basis of $mathbb{P}_n$ and let begin aligned underline $x 0 x 0 0$

$x_1, 0, \dots, x_{n-1}, 0$ in $\mathbb{R}^n$ such that $a_0 x_1^2 + \dots + a_{n-1} x_{n-1}^2 \leq b$
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 this paper demonstrates a remez exchange algorithm applicable
 to approximation of real valued continuous functions of a
 real variable by polynomials of degree smaller than n with
 various linear restrictions in 2 existence and uniqueness
 results were proved in this setting in this article we
 consider mathematical fundamentals of one method for proving
 inequalities by computer based on the remez algorithm the
 basic idea behind the computer based technique is to minimize
 iteratively an error measure that is function of the
 difference between the desired frequency response of the
 filter being designed in the case of linear phase fir filter
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 implements remez algorithm remez algorithm seeks the minimax
 polynomial that approximates a given function in a given
 interval the package includes four m files and one pdf file
 the first m file is called findzero.m it computes the root of
 a given function using the method of chords the remez
 algorithm sometimes spelled remes is used to produce an
 optimal polynomial $p(x)$ approximating a given function $f(x)$
 over a given interval it is an iterative algorithm that
 converges to a polynomial that has an error function with $n+2$
 level extrema by the theorem above that polynomial is optimal
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 tutorial is available in the wiki section build instructions
 are available below example approximate $\arctan \sqrt{3} x^3 \exp 1/x$
 over the range $\sqrt{2} \pi^2$ with a 5th degree polynomial for

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the remez algorithm or remez exchange algorithm published by evgeny yakovlevich remez in 1934 is an iterative algorithm used to find best approximations to functions specifically approximations by functions in a chebyshev space that are the best in the uniform norm 1 sense

finding best minimax approximations with the remez algorithm

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the remez algorithm is an iterative procedure which can be used to find best polynomial approximations in the minimax sense we present and explain relevant theory on minimax approximation after doing so we state the remez algorithm and give several examples created by our matlab implementation of the algorithm we conclude by presenting a

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the remez algorithm remez 1934 also called the remez exchange algorithm is an application of the chebyshev alternation theorem that constructs the polynomial of best approximation to certain functions under a number of conditions the remez algorithm in effect goes a step beyond the minimax approximation algorithm to give a slightly finer

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remez algorithm to understand the remez exchange algorithm first note that 7 can be written as follows let represents $c_{j,j+1}$ then 7 becomes $w_i a_i d_i 1 i 8 a_i d_i 1 i 9$ or $x_m k 0 a_k \cos k i 1 i w_i d_i$ for $i = 1, \dots, 10$ if the set of extremal points in the alternation theorem were

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abiy tasissa abstract the remez exchange algorithm is explained an implementation in python is tested on different test functions we make a comparison with slsqp sequential least squares programming optimizer key words remez exchange minimax polynomial polynomial interpolation 1 overview

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the remez algorithm is a methodology for locating the minimax rational approximation to a function this short article gives a brief overview of the method but it should not be regarded as a thorough theoretical treatment for that you should consult your favorite textbook

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the second step of remez algorithm seeks a new set of $n+2$ points that approach the $n+2$ points of the minimax condition the second step is called the exchange step there are two exchange techniques in the first exchange technique we exchange a single point in the current set of $n+2$ points to get a new set of points while in the second

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the remez algorithm 75 years old is a famous method for computing minimax polynomial approximations most implementations of this algorithm date to an era when tractable degrees were in the dozens whereas today degrees of hundreds or thousands are not a problem

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remez algorithm let $\phi_i, i = 0, 1, \dots, n$ be a basis of $\mathbb{P}_n$ and let $\begin{matrix} x_0 & x_0 & 0 & x_1 & 0 & \dots & x_n & 1 \\ 0 & \text{in } \mathbb{R} & n & 2 & \text{end aligned } 8 \end{matrix}$ such that $a \leq x_0 \leq x_1 \leq \dots \leq x_n \leq 1 \leq b$

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this paper demonstrates a remez exchange algorithm applicable to approximation of real valued continuous functions of a real variable by polynomials of degree smaller than n with various linear restrictions in 2 existence and uniqueness results were proved in this setting

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in this article we consider mathematical fundamentals of one method for proving inequalities by computer based on the remez algorithm

dsp design of fir filters using the remez exchange algorithm

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the basic idea behind the computer based technique is to

minimize iteratively an error measure that is function of the difference between the desired frequency response of the filter being designed in the case of linear phase fir filter design phase frequency responses

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this package implements remez algorithm remez algorithm seeks the minimax polynomial that approximates a given function in a given interval the package includes four m files and one pdf file the first m file is called findzero m it computes the root of a given function using the method of chords

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the remez algorithm sometimes spelled remes is used to produce an optimal polynomial $p(x)$ approximating a given function $f(x)$ over a given interval it is an iterative algorithm that converges to a polynomial that has an error function with $n+2$ level extrema by the theorem above that polynomial is optimal

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readme wtfpl license lolremez a remez algorithm implementation to approximate functions using polynomials a tutorial is available in the wiki section build instructions are available below example approximate $\tan \sqrt{3} x^3 \exp 1/x$ over the range $\sqrt{2}$ to π^2 with a 5th degree polynomial for double floats

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