Subject: New STEM4U package
Posted by koldo on Tue, 25 Feb 2020 07:11:22 GMT
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Hello all

Science, technology, engineering, and mathematics involve a huge need of computing.

New Bazaar package STEM4U includes libraries focused to make life easier for those who want to make a better world through science and technology.

From now it begins with a few libraries. However more will be added in the future. You all are invited to support it being part of the authors' list.

One example of library included is Rational, an arbitrary precision rational number

We use computers for doing floating point calculations. However even using 64 bit types, lack of precision in calculations produce inaccuracies that go accumulating over time, thus increasing the error.

For example, lets compute y = 2/1 * 3/2 * 4/3 * ... If done n times, result has to be n.

However, the code implementing this will fail:
double val = 1;
for (double d = 1; d < 100; ++d)
 val *= (d+1)/d;
Cout() << "double == 100: " << ((dval == 100) ? "true" : "false") << "\n"; // It returns false!?!?
Rational class solves this drawback implementing an arbitrary precision integer rational number.

Subject: Re: New STEM4U package
Posted by koldo on Sun, 12 Jul 2020 14:48:27 GMT
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Now STEM4U includes some financial functions:
- NetPresentValue()
- InternalRateOfReturn()
- PMT() (periodic payment for a loan)

Because successful engineering requires profitable investments ;)

Subject: Re: New STEM4U package
Posted by koldo on Thu, 20 Aug 2020 11:10:21 GMT
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Added Travelling Salesman algorithm. A demo is included in STEM4U_DemoTest.

The Traveling salesman problem (TSP) of a list of points calculates the shortest possible route that visits each point and returns to the origin.

This is a NP-hard problem that for medium sets could be impractical to be solved by an exact algorithm as brute force or linear programming. Because of that, for practical reasons, its resolution using heuristics and approximations is advised.

This implementation uses a Nearest neighbor algorithm to get an initial guess, and follows with a 2-opt algorithm.
template <typename T> T TSP(const Vector<Vector<T>>& matrix,
Vector<int> &order)Returns the total distance of a traveling salesman problem defined by a matrix of distances between nodes. All the elements of the diagonal of this matrix have to be zero, and the elements above the diagonal are considered. It also returns the most optimal order between the nodes.
order may include an initial guess of the right ordering. If not, order should be empty.
template <typename T> T TSP(const Vector<Point_<T>>& points,
Vector<int> &order)Returns the total distance of a traveling salesman problem defined by a list of euclidean coordinates of the points. It also returns the most optimal order between the nodes.
order may include an initial guess of the right ordering. If not, order should be empty.

Subject: Re: New STEM4U package
Posted by koldo on Sun, 23 Aug 2020 08:05:42 GMT
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It is comforting that in these times of tribulation, someone knows how to find his way through the chaos.
:)

File Attachments
1) Sin título.png , downloaded 606 times