
Subject: Re: Added Eigen

Posted by [Sender Ghost](#) on Fri, 10 Aug 2012 10:45:43 GMT

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Hello, Luigi.

forlano wrote on Fri, 10 August 2012 08:42Now, and here comes the problems, I would like to use the same curve, with the same number of parameters, but with a NEW dataset [X,Y] of different size.

Following is a possible implementation:

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```
#include <Core/Core.h>

using namespace Upp;

#include <plugin/Eigen/Eigen.h>
#include <plugin/Eigen/unsupported/Eigen/NonLinearOptimization>

using namespace Eigen;

// Generic functor
template<typename _Scalar, int nx = Dynamic, int ny = Dynamic>
struct Functor {
    typedef _Scalar Scalar;
    enum {
        InputsAtCompileTime = nx,
        ValuesAtCompileTime = ny
    };
    typedef Matrix<Scalar,InputsAtCompileTime,1> InputType;
    typedef Matrix<Scalar,ValuesAtCompileTime,1> ValueType;
    typedef Matrix<Scalar,ValuesAtCompileTime,InputsAtCompileTime> JacobianType;

    int m_inputs, m_values;
    void SetInputsCount(int count) { m_inputs = count; }
    void SetValuesCount(int count) { m_values = count; }

    Functor() : m_inputs(InputsAtCompileTime), m_values(ValuesAtCompileTime) {}
    Functor(int inputs, int values) : m_inputs(inputs), m_values(values) {}

    int inputs() const {return m_inputs;}
    int values() const {return m_values;}

    // you should define that in the subclass :
    virtual void operator() (const InputType& x, ValueType* v, JacobianType* _j=0) const {};
};

class LogisticA_functor : public Functor<double> {
protected:
```

```

double *vx;
double *vy;
public:
void Set(double *x, double *y) { vx = x; vy = y; }

int operator()(const VectorXd &b, VectorXd &fvec) const {
ASSERT(b.size()==m_inputs);
ASSERT(fvec.size()==m_values);
for(int i=0; i<m_values; i++)
fvec[i] = b[0] / (1.0 + b[1]*exp(-1.0 * b[2] * vx[i])) - vy[i];
return 0;
}
};

void DoLevenbergMarquardt(LogisticA_functor& functor, VectorXd& x, double *j, double *k, int
inputs, int values)
{
functor.Set(j, k);
functor.SetInputsCount(inputs);
functor.SetValuesCount(values);
NumericalDiff<LogisticA_functor> numDiff(functor);
LevenbergMarquardt<NumericalDiff<LogisticA_functor>> lm(numDiff);

int ret = lm.minimize(x);
if (ret == LevenbergMarquardtSpace::ImproperInputParameters ||
ret == LevenbergMarquardtSpace::TooManyFunctionEvaluation)
Cout() << "\nNo convergence!: " << ret << '\n';
else
for (int i = 0; i < inputs; ++i)
Cout() << "Parameter: " << i << " = " << x[i] << '\n';
}

void NonLinearOptimization() {
const int inputs = 3;
VectorXd x(inputs);
x << 5., 5., 0.01; // Initial values

LogisticA_functor functor;
Cout() << "First run\n";
double jx[13] = {-280.0, -240.0, -200.0, -160.0, -120.0, -80.0, -40.0, 0.0, 40.0, 80.0, 120.0, 160.0,
200.0},
jy[13] = {0.061276, 0.071429, 0.091574, 0.112821, 0.132959, 0.131597, 0.167887, 0.198380,
0.221380, 0.292292, 0.351831, 0.445803, 0.497754};
VectorXd j = x;
DoLevenbergMarquardt(functor, j, jx, jy, inputs, 13);

Cout() << "Second run with new data of different length and same curve to fit\n";
double kx[15] = {-280.0, -240.0, -200.0, -160.0, -120.0, -80.0, -40.0, 0.0, 40.0, 80.0, 120.0, 160.0,

```

```
200.0, 240.0, 280.0},  
ky[15] = {0.061276, 0.071429, 0.091574, 0.112821, 0.132959, 0.131597, 0.167887, 0.198380,  
0.221380, 0.292292, 0.351831, 0.445803, 0.497754 , 0.609337,0.632353};  
VectorXd k = x;  
DoLevenbergMarquardt(functor, k, kx, ky, inputs, 15);  
}  
  
CONSOLE_APP_MAIN  
{  
NonLinearOptimization();  
}
```
