DLQR application

We will work on the example of a car that wants to reach its destination.

To simplify, the car has an initial speed (in m/s) in the direction of the road and an initial distance (in m) from the destination. The engine can consume 1 unit of energy to change the speed by 1 m/s. In this case, the car loses 2% of its speed per second due to friction.

Time will be divided into units of 1 second. We will denote it as .

The operation will unfold over Ns.

The system must act on the engine in such a way that the penalties P are minimized. The penalties are obtained in the following manner:

|  |  |
| --- | --- |
| Variable | Penaty |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

such as

We can easly verify the following equations:

. such that is the amouth of energie consumed by the engine.

In order to solve the problem, we note ;

and the following matrixes:

From which we can conclude the following:

and

So we can apply DLQR.

Numerical values:

Results:





