Trifocal tensor

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January 2, 2013

Contents

0.1 List of the elements

Display the help in english with -h : element requested, encoded but not working.

Launch into the consol with the name of the three pictures to load : element requested, encoded and working.

Launch into the consol with the name of the three lists to load : element requested, encoded and working.

Saving a list of clicked points : element requested, encoded but not working.

Calculation of a tensor : element requested, encoded and working.

Transfert the points with the tensor : element requested, encoded and working.

0.2 Description of the elements encoded

0.2.1 Tensor

In order to build the tensor, we found the 27 equations derivated from this one :

$$\sum_{k=1}^{3} x_p^k (x_p^{'i} x_p^{''3} T_k^{3l} - x_p^{'3} x_p^{''3} T_k^{il} - x_p^{'i} x_p^{''l} T_k^{33} + x_p^{'3} x_p^{''l} T_k^{i3})$$

Let's call A_k^{il} the coefficient of the T_k^{il} elements in all these equations. We noticed that there were only four coefficient for one equation, the others were then equal to zero.

A row of the matrix A is $[A_1^{il}, A_2^{il}, A_3^{il}]$. There is 28 rows since there are four equations a point, and seven points. We just need to choose carefully the subscripts.

Here is the pseudocode of the fullfilling of the A matrix :
FOR p from 0 to 6

FOR i from 0 to 1

FOR l from 0 to 1

FOR k from 0 to 2

A[4p+2i+l, 9k+3i+l]= $-x_p^k x_p^{'3} x_p^{''3}$
A[4p+2i+l, 9k+3i+2]= $x_p^k x_p^{'3} x_p^{''l}$
A[4p+2i+l, 9k+6+l]= $x_p^k x_p^{'i} x_p^{''3}$
A[4p+2i+l, 9k+8]= $-x_p^k x_p^{'i} x_p^{''l}$

increment k of 1
increment l of 1 END FOR
increment i of 1 END FOR

END FOR

increment p of 1
END FOR

Then, we use the SVD of Eigen Library to decompose A. t is the last column of the V matrix.

We don't forget to put the elements of t in the real tensor T. And then we have a functional tensor.

0.2.2 Transfert

The transfert was a difficult part of the project. First, we focus on the transfert for the first image.

Transfert on the first picture

The main difficulty was to transform the equations into matrices and vector. At the beginning, we tried to use the SVD one the same way that for the tensor since we did'nt see that it was an equation like $Bx = b$. In order to simplify the calculations, we decided to put all the third coordinates to 1. So the matrix B was a 4x2 matrix. To fulfill the B matrix, we used the same loop than to fulfill A, removing the one with p. Thus, in order find the eighth point of the first image, we had this :
FOR i from 0 to 1

FOR l from 0 to 1

FOR k from 0 to 2

B[2i +j, 0]= $list2(7,i)T_2^{j0} - T_i^{j0} -$
$list2_(7,i)list3(7,j)T_2^{20}+list3(7,j)T_i^{20}$
B[2i +j, 1]= $list2(7,i)T_2^{j1} - T_i^{j1} -$
$list2(7,i)list3(7,j)T_2^{21}+list3(7,j)T_i^{21}$

increment k of 1

increment l of 1
END FOR

increment i of 1
END FOR

END FOR

We calculate the b vector in the same loop and apply the method solve of the Eigen Library.

Transfert on the second and third picture

We take time to understand the fact that the column of the matrix B were not depending on k anymore, but on i for the second picture and l for the third. Once understood, the method is the same unless that BKDKSJDNL-SJBHDLJGSLJSLHGLG

Once working for the three pictures, we put conditions on the click event to calculate the right transfert an change de 7 on the number of rows - 1 of the list.

0.2.3 Saving the clicked points

Enregistrement des points: - Dabord, des listes de 7 points, au clic, le premier point est remplac : nul - liste de 8 points : le 8me point est celui calcul par le transfert (dans list.list) - listes de n points enregistrs dans list.list = mieux, mais pas bien car modifie le fichier initial - list de n points enregistrs dans tmp/list.list = beaucoup plus mieux - fonction permettant de faire tout a : encore plus mieux;

0.2.4 Save or load in a file

Sauvegarde/Chargement dans un fichier : - Au dpart, criture dans les fichiers initiaux : bouh pas bien - Sauvegarde dans les fichiers tmp - A faire : lutilisateur peut choisir le fichier o sont enregistrs les points

Format de sauvegarde : activation du header en true dans saveMatrix()