

Guides on ARAP Software

Feb. 28, 2009

Introduction

- **About the package**

After you unzip the package, you can see the following files:

“ARAPPara.exe”: the executable program of the software

Folder \data: Some test mesh data and texture data

“glut32.dll, libguide40.dll”: required DLL files

“ARAP_Specification.doc”: this document you are reading

- **Running requirements**

This software “ARAPPara.exe” should be run in Windows XP or Windows 2003. You need to install Microsoft Visual Studio .Net 2005 or 2008. If you do not have it in your computer, you should install “*Microsoft Visual C++ 2005 Redistributable Package (x86)*” which can be found by Google and downloaded in the internet.

The DLL files “glut32.dll” and “libguide40.dll” are needed to run the software. These files should be in the system folder or in the same folder with the executable program.

- **About the algorithm**

This software, called ARAP Parameterization, is based on the following paper:

[1] Ligang Liu, Lei Zhang, Yin Xu, Craig Gotsman, Steven J. Gortler. A Local/Global Approach to Mesh Parameterization. *Proceedings of Eurographics Symposium on Geometry Processing 2008* (SGP 2008), Copenhagen, July 2-4, 2008.

The paper can be downloaded via:

http://www.math.zju.edu.cn/ligangliu/Publicatoins/Publicatoins/2008_SGP_Liu.pdf

Software interfaces

The software interfaces are shown in Fig. 1-5.

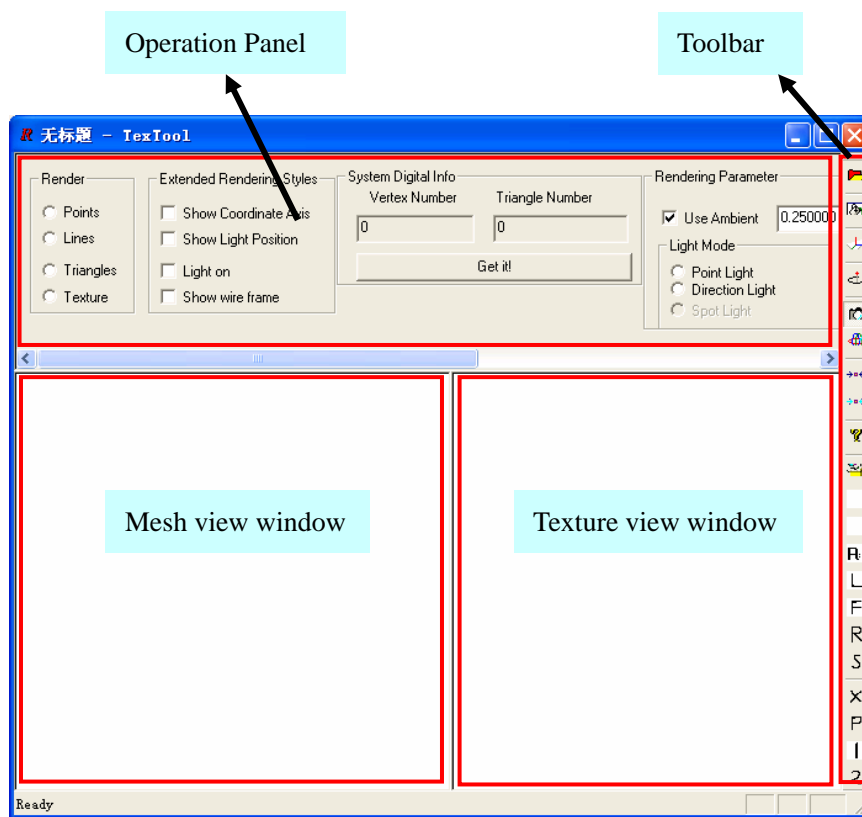


Fig. 1 Software interfaces

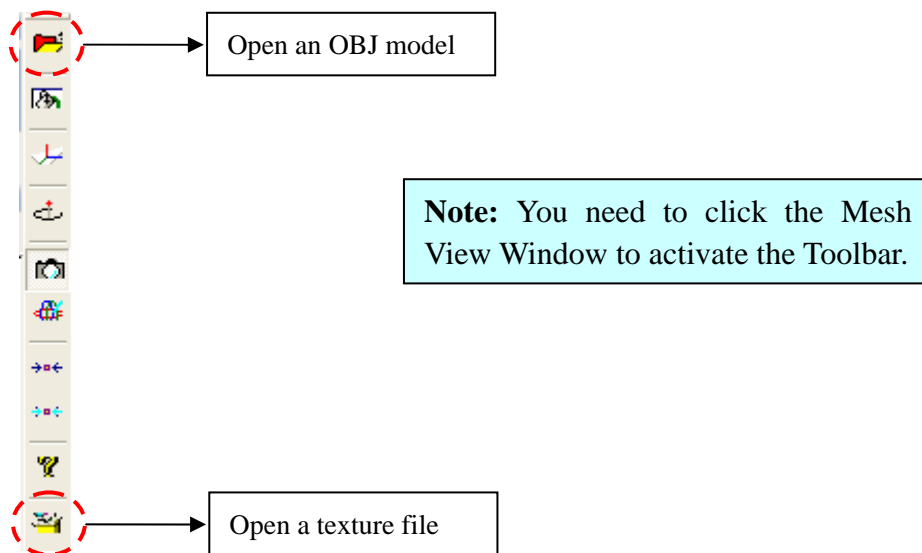


Fig. 2 Toolbar

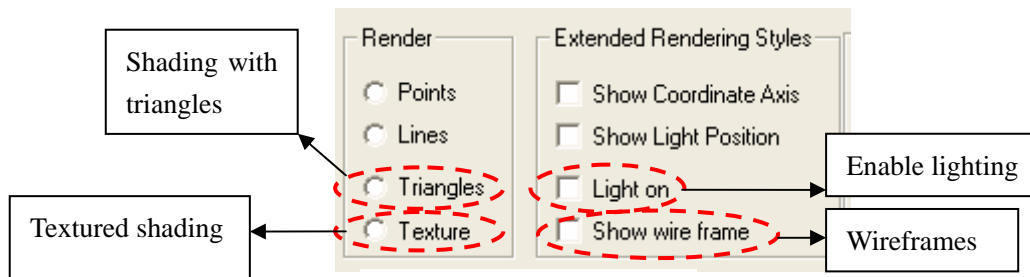
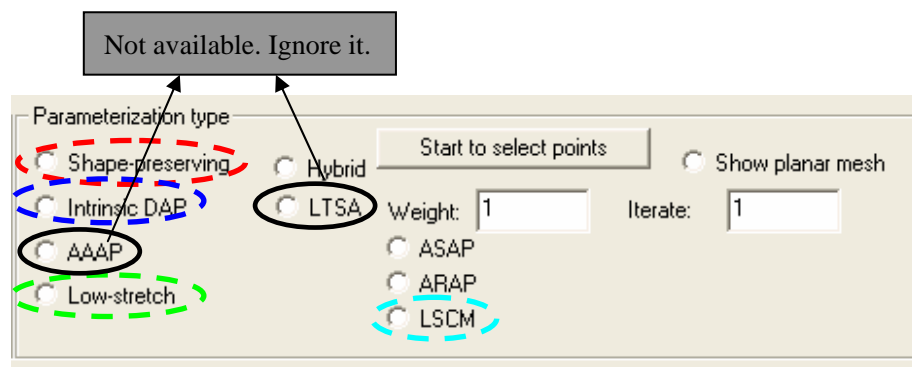


Fig. 3 Shading panel



Shape-preserving: FLOATER, M. 1997. Parametrization and smooth approximation of surface triangulations. *Comput. Aided. Geomet. Des.* 14, 3 (April), 231–250.

Intrinsic DAP: DESBRUN, M., MEYER, M., AND ALLIEZ, P. 2002. Intrinsic parameterizations of surface meshes. In *Proceedings of Eurographics*. 209–218.

Low-stretch: YOSHIZAWA, S., BELYAEV, A., AND SEIDEL, H.-P. 2004. A fast and simple stretch-minimizing mesh parameterization. In *Proceedings of the Shape Modeling and Applications*. 200–208.

LSCM: LEVY, B., PETITJEAN, S., RAY, N., AND MAILLOT, J. 2002. Least squares conformal maps. *ACM Trans. Graph. (SIGGRAPH)*. 362–371.

Fig. 4 Previous approaches

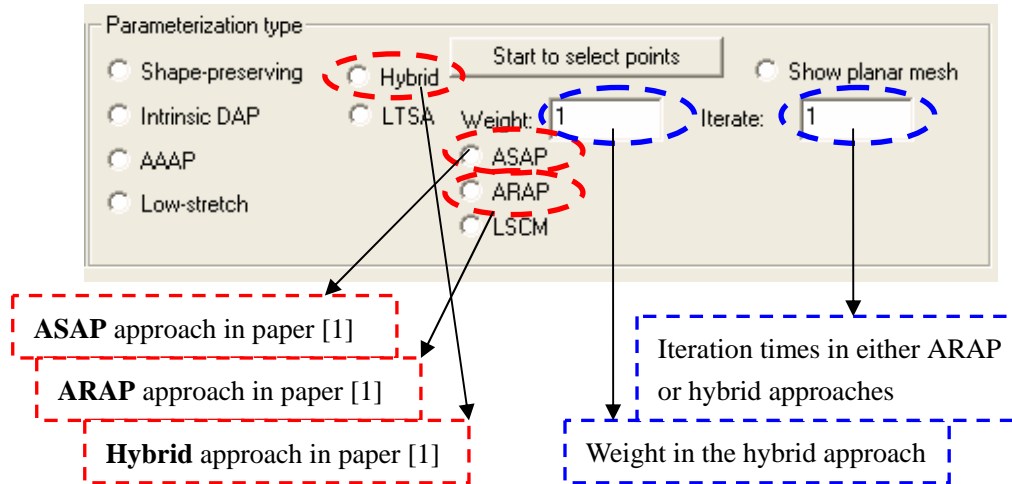



Fig. 5 The approaches in [1]

Parameterization

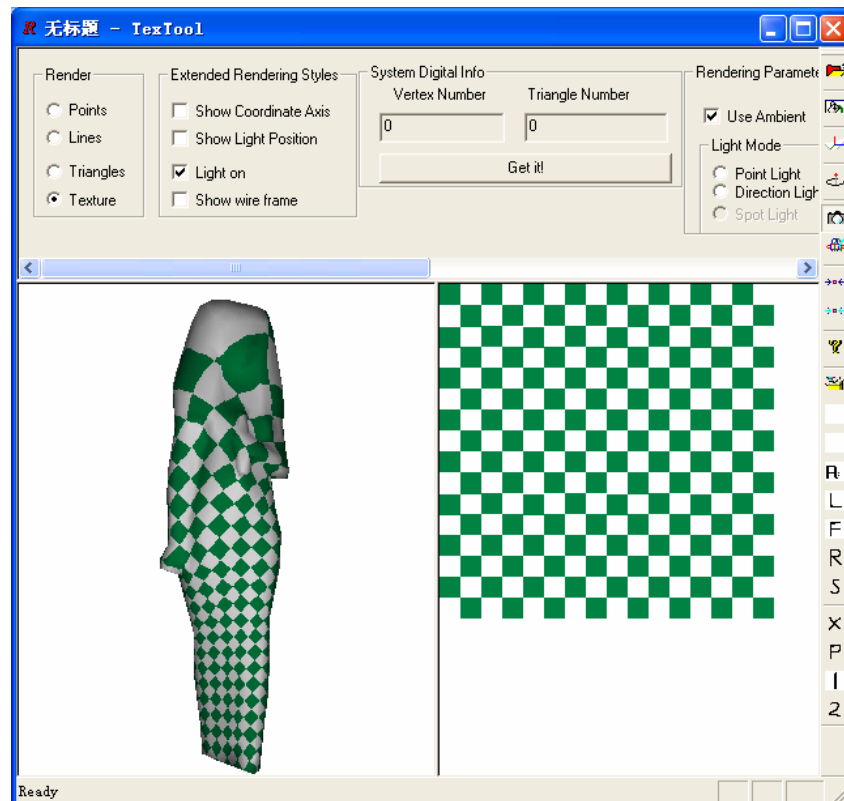
- Load the mesh and texture

Press button  on the toolbar to load a triangle mesh (*.obj) with texture coordinates.

Note that we need the texture coordinates as the initial guess of ARAP parameterization methods. The texture coordinates will be the initial guess of ARAP parameterization methods. In the paper [1], we choose **ABF** Method (SHEFFER, A. AND DE STURLER, E. 2001. Parameterization of faceted surfaces for meshing using angle based flattening. *Engin. Comput.* 17, 326–337.) to generate the initial guess.

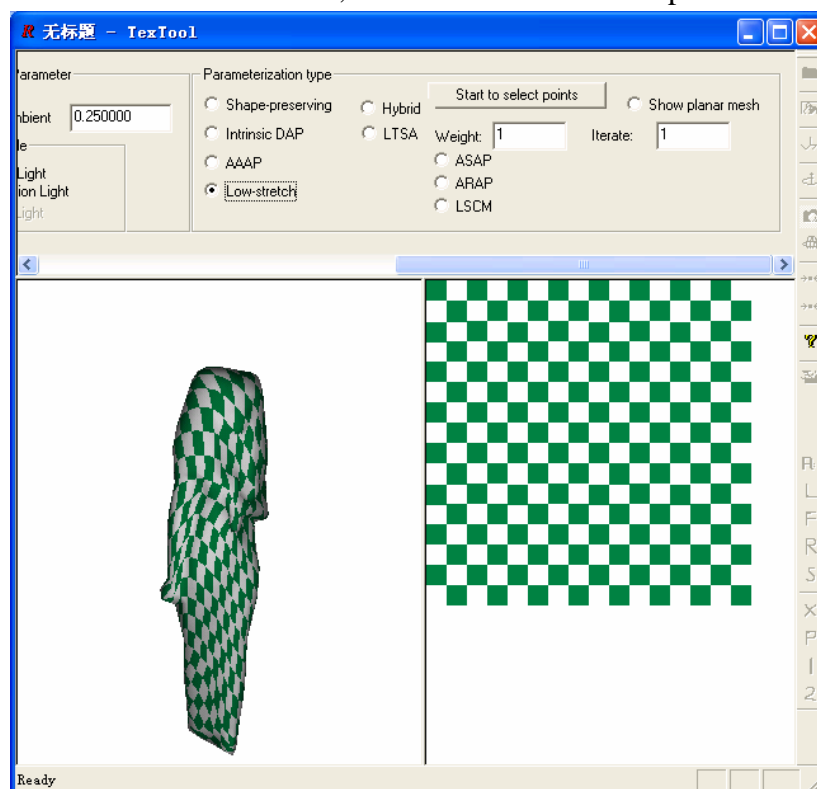
All the obj meshes with texture coordinates in \data folder are generated by ABF method.

Drag the mouse to view the model: pressing the left button to rotate the mesh and pressing the right button to scale the mesh.



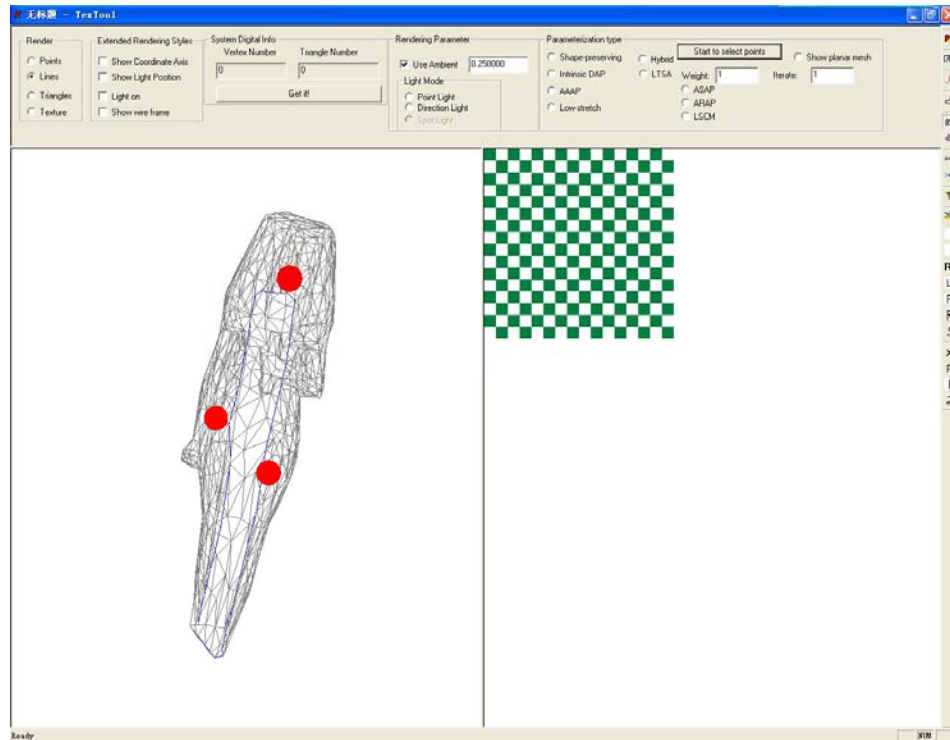
- For these approaches: ☐ Shape-preserving / ☐ Intrinsic DAP / ☐ Low-stretch

Just select one of these radio-buttons, then the results will be updated in the window.



- For ☐ Hybrid / ☐ ASAP / ☐ ARAP / ☐ LSCM :

1. Press button in the operation panel to start Mesh-Vertex-Selecting Mode;
2. Using line or wireframe rendering mode, arbitrarily select three vertices on the mesh by left button of the mouse while pressing “A” key at the same time.



3. (only for ☐ ARAP and ☐ Hybrid):

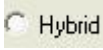
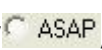


For ☐ ARAP :

Input the iteration time , the program will stop when (1) the error is within some specific tolerance; or (2) the iterate time exceed the input iteration time. Usually one could input 100-1000.



For ☐ Hybrid :

For the hybrid approach, we should also set the weight in addition to set the weight as above. As shown in paper [1], different weights will have different parameterization results: setting weight as 0.000001 will get the result quite similar as LSCM/ASAP, while setting weight as 10 will get result similar as ARAP. Other weights between these two numbers will have the hybrid result, according to the paper.

Warning: Do NOT set 0 for weight!

4. Select one of the buttons  Hybrid /  ASAP /  ARAP /  LSCM . Then the results will be updated and shown in the window.

Saving the result

- Press button  in tool bar to save the parameterization result as a planar OBJ mesh data with texture coordinates.
- Press button  in tool bar to save the parameterization result as a 3D OBJ mesh data with texture coordinates.

Contact

Feel free to contact us if there is any problem:

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