Automatic Texture Mapping for Large-Scale 3D City Model by Temporal Height Image (THI)

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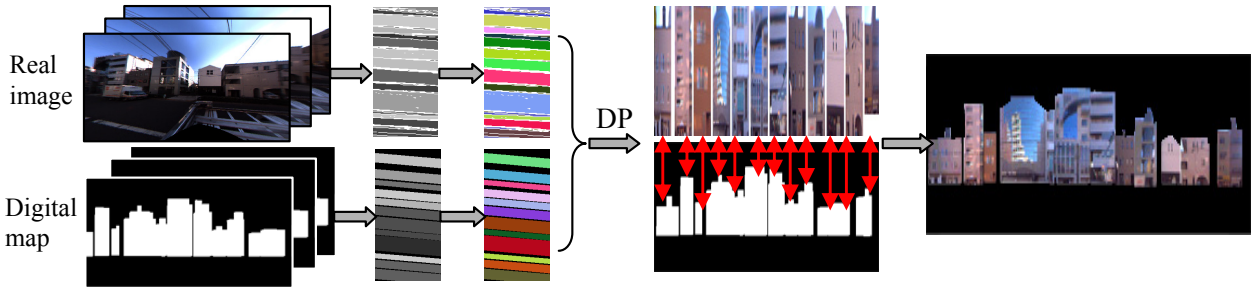
Our goal is to make texture mapping onto large-scale 3D city model automatically. The main issue is to extract buildings from urban actual image stably. To solve this issue, we propose a novel expression of space-time volume, called "Temporal Height Image (THI)". Assigning a gray value in proportion as height to all the objects in the space-time volume, we can obtain THI by looking the volume above. The THI has similar concept as EPI (Epipolar Plane Image), whereas, THI can overcome the shortages of EPI (i.e. edges inside the building disrupt result, different EPIs with different slice heights). Then, making THIs from urban actual image and digital map, we can align buildings between the two THIs by DP-matching. Using DP result, texture of target building model can be found automatically. We tried our method in two scenes and they were both well done.

Publications

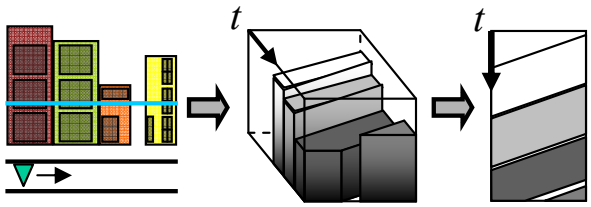
[1] J. Wang, S. Ono, K. Ikeuchi, "Proposal of Temporal Height Image and Matching On-vehicle Camera Image and 3D Building Model by THI" (in Japanese), IEICE Trans. on Information and Systems, Vol. J92-D, No. 8, Aug. 2009.

[2] J. Wang, S. Ono, K. Ikeuchi, "Temporal Height Image and Alignment of Actual Urban Image and Map by THI" (in Japanese), Proc. Meeting on Image Recognition and Understanding (MIRU), Jul. 2008.

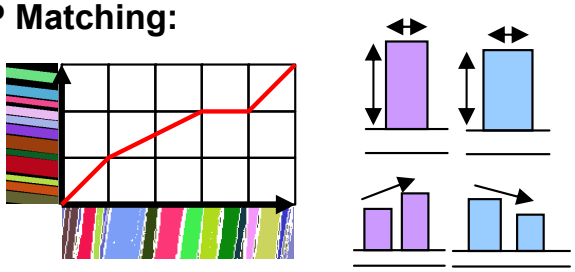
Processing Flow:



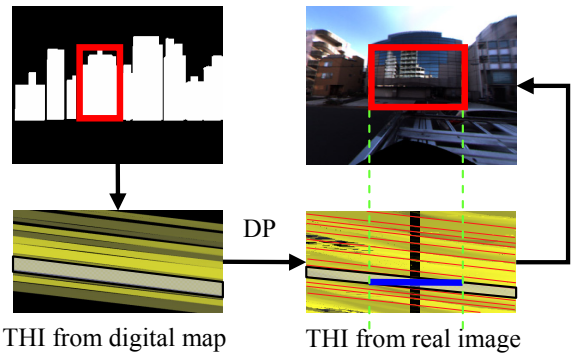
THI:



DP Matching:



Texture mapping for a building model:



Experimental result: