Road extraction from very high resolution remote sensing imagery with level set methods

Hongchao MA, Yun Yang
Proposed presenter: Hongchao MA
Mailing address: School of remote sensing information engineering, Wuhan University, Wuhan, China, postal code:430079
Hongchao MA: hchma@whu.edu.cn 86-27-68778523
Yun Yang : yangyunbox@163.com 86-27-68778523

ABSTRACT: Road extraction from very high resolution remote sensing imagery is a difficult problem both to computer vision community and remote sensing practitioners. Level set evolution theory is introduced to roads extraction from very high resolution remote sensing imagery in order to improve performance in case of very low contrast, shadowed or occluded urban areas. Level set method models boundary or surface by implicit form in a higher dimension. The boundary or surface which is modeled becomes a zero level function, which has the form $\Gamma(t) = \{(x, y) \mid \Phi(x, y, t) = 0\}$. Given one or several seed point, initial conditions and the speed control force, the initial curve or surface will evolution to a final place when some stopping condition is satisfied. Roads have width in high resolution imagery, and many other manmade objects such cars, advertise board and even individuals should be filtered out. Taking the time variable in the evolution equation as a scale factor, all these manmade objects can be moved out, and the left is road region. Bearing in mind that problems such as boundary leak, sub- and over-segmentation are common in conventional level set based image segmentation, an improved level set evolution model based on adaptive narrow band is presented which can excellently extract road regions from very high resolution imagery, with some shadowed or occluded areas. Meanwhile, this method greatly reduces computation load as well as accelerates the evolution.