World Academy of Science, Engineering and Technology
International Journal of Geotechnical and Geological Engineering
Vol:12, No:10, 2018

Spatial Relationship of Drug Smuggling Based on Geographic Information System Knowledge Discovery Using Decision Tree Algorithm

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Abstract : In this investigation, we focus on discovering spatial relationship of drug smuggling along the northern border of Thailand. Thailand is no longer a drug production site, but Thailand is still one of the major drug trafficking hubs due to its topographic characteristics facilitating drug smuggling from neighboring countries. Our study areas cover three districts (Mae-jan, Mae-fahluang, and Mae-sai) in Chiangrai city and four districts (Chiangdao, Mae-eye, Chaiprakarn, and Wienghang) in Chiangmai city where drug smuggling of methamphetamine crystal and amphetamine occurs mostly. The data on drug smuggling incidents from 2011 to 2017 was collected from several national and local published news. Geo-spatial drug smuggling database was prepared. Decision tree algorithm was applied in order to discover the spatial relationship of factors related to drug smuggling, which was converted into rules using rule-based system. The factors including land use type, smuggling route, season and distance within 500 meters from check points were found that they were related to drug smuggling in terms of rules-based relationship. It was illustrated that drug smuggling was occurred mostly in forest area in winter. Drug smuggling exhibited was discovered mainly along topographic road where check points were not reachable. This spatial relationship of drug smuggling could support the Thai Office of Narcotics Control Board in surveillance drug smuggling.

Keywords : decision tree, drug smuggling, Geographic Information System, GIS knowledge discovery, rule-based system
Conference Title : ICGGIS 2018 : International Conference on Geoinformatics and GIS
Conference Location : Bali, Indonesia
Conference Dates : October 22-23, 2018