Abstract |

Evaluation of conventional digital camera scenes for Thematic Information Extraction

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Introduction

The increasing availability of remote-sensing images, acquired periodically by satellite sensors on the same geo makes it extremely interesting to develop the monitoring systems capable of automatically producing and reg landcover maps of the considered site (Bruzzone, et al., 2002). Airborne remote sensing was selected in this because of several reasons. First was the airborne images can provides higher spatial resolution for mapping area. Second was the airborne data acquisition can be carried out according to our planned surveys. It's not li data was fixed on time of satellite overpass the study area only. Third, for airborne remote sensing, atmospheric not need to apply to the analysis data because atmospheric correction only improves R2 and RMS significantly fo is an advantage since one step of the retrieval process can be eliminated (Koponen, et al., 2002). The objective to investigate the potentiality of using digital camera imagery for land cover mapping. In this study, images ca digital camera were used for land cover mapping. Supervised classification methods were applied to the digital researchers used the Maximum Likelihood method in their study (Donoghue and Mironnet, 2002). The monitori accomplished by supervised classification techniques, which have proven to be effective categorization tools (Bi 2002). Accuracy assessment also has been done in this study.

Study Area

(a) Area A
Source: Microsoft Corp., 2001.
Figure 1. The study area

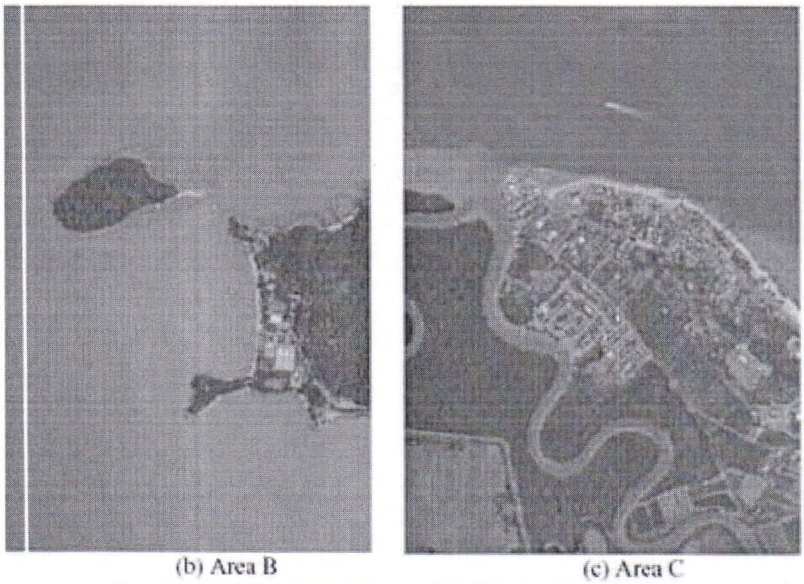
Merbok River estuary was chosen as the study area in this study. The study area is located at latitude 5° 39' N t longitude 100o 20' E to 100o 24' E (Figure 1). The images were captured from a light aircraft flying at an altitude 9 March 2002.

Data Analysis And Result

The size of the airborne colour digital images used in this study of the Merbok River estuary, Kedah is 1200 pixel namely Area A, Area B and Area C (Figure 2). Three supervised classification methods were performed to the (Maximum Likelihood, Minimum Distance-to-Mean, and Parallelepiped). Training sites were needed for supervise and selected based on the colour in present study. The digital image was classified into 4 classes, such as wat and urban. Accuracy assessment was done in this study to compute the probability of error for the classified map samples were chosen randomly for the accuracy assessment. Many methods of accuracy assessment have bee remote sensing literatures. Three measures of accuracy were tested in this study, namely overall accuracy, e Kappa coefficient. In thematic mapping from remotely sensed data, the term accuracy is used typically to expres 'correctness' of a map or classification (Foody, 2002). Figure 3 shows the flow chart for data processing of the im

(a) Area A

Figure 2: Digital images used in image classification



(b) Area B (c) Area C

Figure 2: Digital images used in image classification

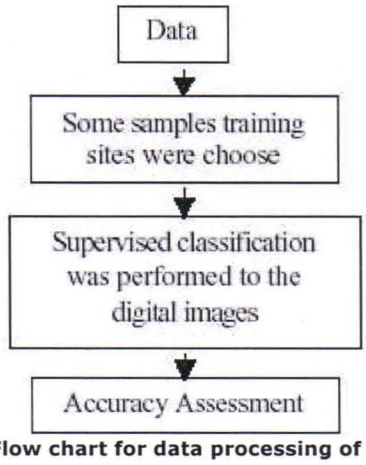


Figure 3: Flow chart for data processing of the images

(A) Area A

Kappa coefficient and overall accuracy results of the three measures of accuracy are shown in Table 1. The ove expressed as a percentage of the test-pixels successfully assigned to the correct classes. The results obtained a Tables 1, 2 and 3, where the overall classification accuracy, the confusion matrix and the accuracy of ea Maximum Likelihood, minimum distance-to-mean and parallelepiped classification are given, respectively. Fro analysis, one can see that the Maximum Likelihood classifier produced the best image classification accuracy w overall accuracy and Kappa coefficient. The overall classification accuracies achieved by the proposed Maxir classifier on the digital image is 92.00 %. This followed by the Minimum Distance-to-Mean with the overa accuracy of 85.50%, and Parallelepiped resulted in the overall classification accuracy of 67.00%. A classifie Maximum Likelihood classifier is shown in Figure 4.

Table 1: The overall classification accuracy and Kappa coefficient

Classification method	Overall classification accuracy (%)	Kappa coefficient
Maximum Likelihood	92.00	0.884
Minimum Distance-to-Mean	88.50	0.832
Parallelepiped	67.000	0.561

Data Supervised classification was performed to the digital images Some samples training sites were ch Assessment

Table 2: The confusion matrix results

Classified Data	Reference Data				
	Forest	Water	Water Turbid	Land	Total
Forest	72	2	0	1	75
Water	3	65	3	1	72
Turbid Water	0	4	33	1	38
Land	0	0	0	14	15
Total	76	71	36	17	200

Table 3: The accuracy of each class using Maximum Likelihood classification.

Class	Maximum Likelihood	
	Producer Accuracy (%)	User Accuracy (%)
Forest	94.737	96.000
Water	91.549	90.278
Turbid Water	91.667	86.842
Urban	82.353	93.333

Figure 4: The classified image obtained using Maximum Likelihood classifier for Merbok River estuary (Green = Forest Orange = Land, and Light Blue = Turbid Water)

(B) Area B

The Kappa coefficient and overall accuracy value for the three-classification technique are shown in Table accuracy assessment results are presented in Tables 5 and 6, where the Kappa coefficient, the confusion accuracy of each class using Maximum Likelihood, minimum distance-to-mean and parallelepiped classificat respectively. From the present analysis, one can see that the Maximum Likelihood classifier produced th classification accuracy with the highest overall accuracy and Kappa coefficient. The overall classification accur by the proposed Maximum Likelihood classifier on the digital image is 95.00 %. This followed by the Minimum Dis with the overall classification accuracy of 73.00%, and Parallelepiped resulted in the overall classification accura classified image using Maximum Likelihood classifier is shown in Figure 5.

Table 4: The overall classification accuracy and Kappa coefficient

Classification method	Overall classification accuracy (%)	Kappa coefficient
Maximum Likelihood	95.000	0.866

Minimum Distance-to-Mean	73.000	0.457
Parallelepiped	1.000	0.008

Table 5: The confusion matrix results

Classified Data	Reference Data				
	Grass	Water	Land	Urban	Total
Grass	21	1	0	0	22
Water	0	154	1	0	155
Land	2	2	12	4	20
Urban	0	0	0	3	3
Total	23	157	13	7	200

Table 6: The accuracy of each class using Maximum Likelihood classification.

Class	Maximum Likelihood	
	Producer Accuracy (%)	User Accuracy (%)
Grass	91.304	95.455
Water	98.089	99.355
Land	92.308	60.000
Urban	42.857	100.000

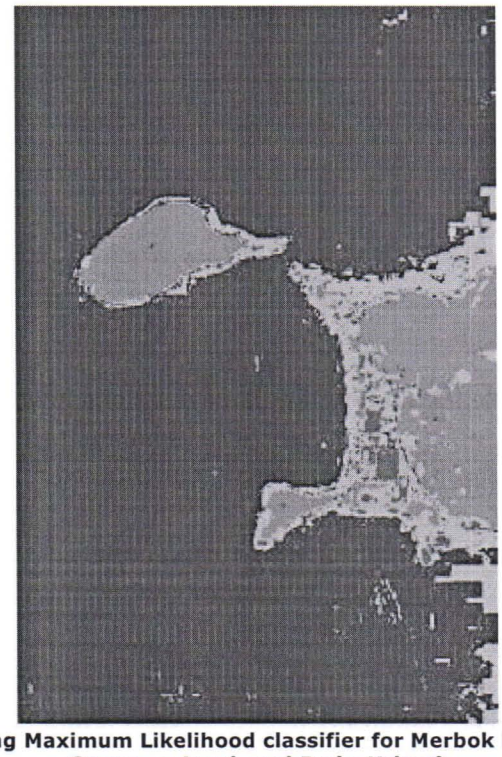


Figure 5: The classified image obtained using Maximum Likelihood classifier for Merbok River estuary (Green = Forest Orange = Land, and Red =Urban)

(C) Area C

The Kappa coefficient and overall accuracy value for the three-classification technique are shown in Table accuracy assessment results are presented in Tables 8 and 9, where the Kappa coefficient, the confusion accuracy of each class using Maximum Likelihood, minimum distance-to-mean and parallelepiped classificat respectively. From the present analysis, one can see that the Maximum Likelihood classifier produced th

classification accuracy with the highest overall accuracy and Kappa coefficient. The overall classification accur by the proposed Maximum Likelihood classifier on the digital image is 79.50 %. This followed by the Minimum Dis with the overall classification accuracy of 76.50%, and Parallelepiped resulted in the overall classification accurac classified image using Maximum Likelihood classifier is shown in Figure 6.

Figure 6: The classified image obtained using Maximum Likelihood classifier for Merbok River estuary (Green = Forest Orange = Land, and red = Urban)

Table 7: The overall classification accuracy and Kappa coefficient

Classification method	Overall classification accuracy (%)	Kappa coefficient
Maximum Likelihood	79.50	0.70
Minimum Distance-to-Mean	76.50	0.652
Parallelepiped	10.00	0.069

Table 8: The confusion matrix results

Classified Data	Reference Data				
	Grass	Water	Land	Urban	Total
Grass	59	2	3	1	65
Water	5	72	10	2	89
Land	1	1	22	3	27
Urban	2	2	9	6	19
Total	67	77	44	12	200

Table 9: The accuracy of each class using Maximum Likelihood classification.

Class	Maximum Likelihood	
	Producer Accuracy (%)	User Accuracy (%)
Grass	88.060	90.769
Water	93.506	80.899
Land	50.000	81.481

Urban	50.000	31.579

Conclusion

In this study, Maximum Likelihood was the best classifier to extract thematic information from remote sensed ima spatial resolution images gave a more detail deposition mapping of the classified map. So it is good for a sm study area. From the result of the accuracy assessment, we were quite confident of the classified shown. imagery provides a cheaper way to acquired remote sensed imagery for land cover mapping.

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