Supplementary Information for: "An Object- and Topology-Based Analysis (OTBA) Method for Mapping Rice-Crayfish Fields in South China"

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Table S1. Classification features for extracting RCFs using RGB image.

Feature Category	Selected Features	Equations	Parameters	References
Spectral features	G-index (Greenness index)	$G-index=\frac{Green}{Red}$	*Blue, Green, Red* = surface reflectance values of Blue, Green and Red bands. $\#P_v$ = total number of pixels contained in the object P_v. $c_k(x,y,z,t)$ = the image layer intensity value at pixel (x,y,z,t). N_v^B = the darker direct neighbor to v, with $N_v^B\left\{u\in N_v:\bar{c}_k(u)<\bar{c}_k(v)\right\}$. $b(v,u)$ = the length of common border between v and u.	[1]
	VIgreen (Green vegetation index)	$VIgreen=\frac{Green-Red}{Green+Red}$		[2]
	Brightness	$\bar{c}(v)=\frac{1}{3}\sum_{k=1}^{3}\bar{c}_k(v)$		
	Mean Blue, Green, Red	$\bar{c}_k(v)=\frac{1}{\#P_v}\sum_{(x,y,z,t)\in P_v}c_k(x,y,z,t)$		
	Rel. border to brighter objects Green	$\sum_{u\in N_v^B}\frac{b(v,u)}{b_v}$		[3]
Geometric features	Area	$A_v=\#P_v\times u^2$	u = the pixel size in coordinate system units. b_0 = the length of outer border. b_i = the length of inner border.	[3]
	Border length	$b_v=b_o+b_i$		
	Length/Width	$\gamma_v=\min\gamma_v^{EV},\max\gamma_v^{BB}$		

	Shape index	$s_v = \frac{b_v}{4\sqrt{A_v}}$	γ_v^{EV} = the ratio length of v of the eigenvalues. γ_v^{BB} = the ratio length of v of the bounding box.	
Textural features	GLCM Mean	$\mu_{i,j} = \frac{\sum_{i,j=0}^{N-1} P_{i,j}}{N^2}$	i = the row number. j = the column number. $P_{i,j}$ = the normalized value in the cell i, j. N = the number of rows or columns.	[3]
	GLCM Std Dev	$\sigma_{i,j} = \sqrt{\sum_{i,j=0}^{N-1} P_{i,j}(i, j - \mu_{i,j})}$		
	GLCM Entropy	$e_{i,j} = \sum_{i,j=0}^{N-1} P_{i,j}(-\ln P_{i,j})$		
	GLCM Homogeneity	$h_{i,j} = \sum_{i,j=0}^{N-1} \frac{P_{i,j}}{1 + (i-j)^2}$		
	GLCM Contrast	$c_{i,j} = \sum_{i,j=0}^{N-1} P_{i,j}(i-j)^2$		

Table S2. Accuracy assessment about classification results derived by using images with different spectral bands.

	Image with Three Bands (R, G, B)		**Image with Four Bands (R, G, B, NIR)**	
	Producer's Accuracy	User's Accuracy	Producer's Accuracy	User's Accuracy
RCF	75.59%	84.96%	90.32%	93.33%
Non-RCF	85.71%	76.69%	93.28%	93.33%
Overall Accuracy	80.49%		91.77%	

Table S3. Accuracy assessment about classification results derived by using images in different phases.

	Flooding Phase		**Rice Growth Phase**	
	Producer's Accuracy	User's Accuracy	Producer's Accuracy	User's Accuracy
RCF	83.64%	89.32%	90.32%	93.33%
Non-RCF	88.42%	82.35%	93.28%	93.33%
Overall Accuracy	85.85%		91.77%	

References

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