

HYPERSPECTRAL IMAGING FOR THE ASSESSMENT OF QUALITY AND SAFETY OF SALMON AND COD FINFISH

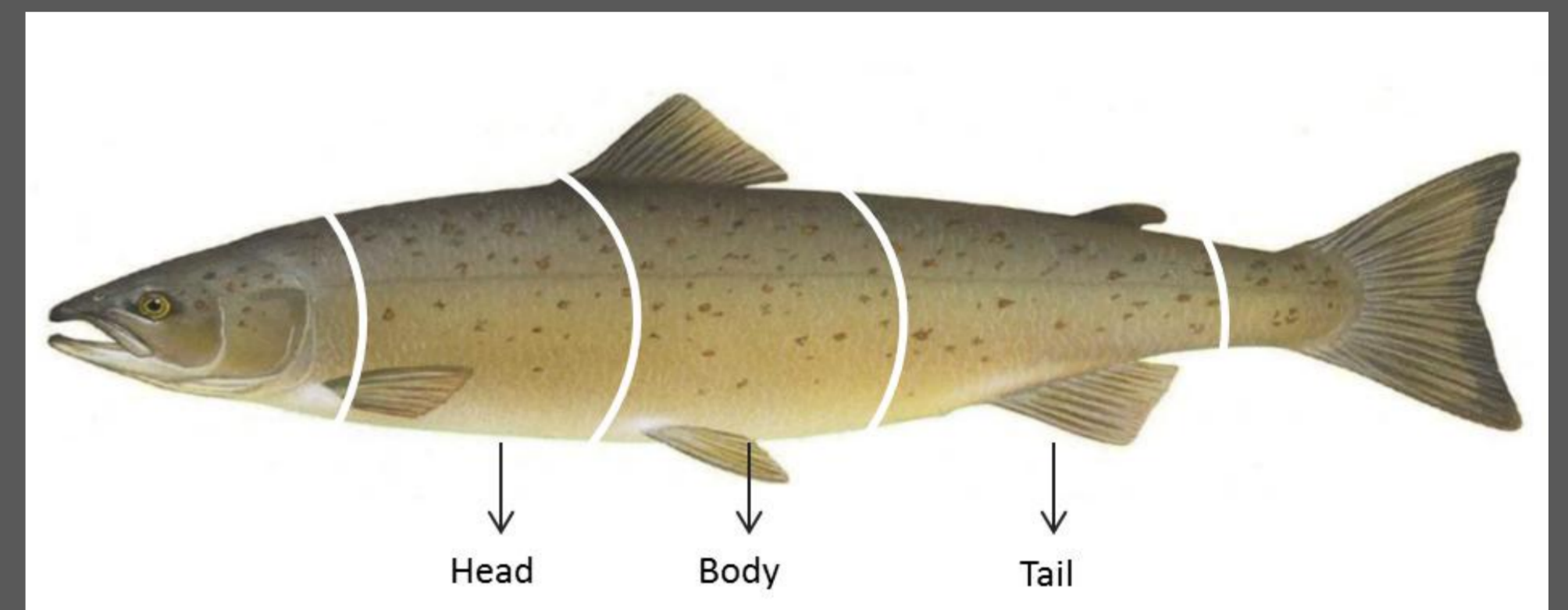
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INTRUDUCTION: Freshness is one of the main quality attributes for fish processing, marketing and consumption. It indicates the degree of various physical, chemical, biochemical and microbiological changes in fish. Instrumental methods independent of the subjective opinion of human judges are needed to meet the demand for quality measurement in the fish industry

AIM: To identify critical image features representing freshness on finfish using NIRS and Vis HIS and chemometric tools.

METHOD: Two hyperspectral images systems operating in the visible range and the near infrared range were applied for non-invasive determination of seven parameters (Days of storage ,Total Viable Count or TVC, Total Volatiles Bases of Nitrogen or N-TVB, colour, fat content, Water Holding Capacity or WHC and K-index) for two species (*Salmo Salar*, and *Gadus Morhua*)

RESULTS: The comparison between different pre-processing, spectra selection, outliers detection and calibration algorithms methods resulted in several models, whose performance were evaluated in terms of root mean square error (RMSE) of calibration (RMSEC) and coefficient of determination (R^2) of calibration (R^2 Cal) in the calibration process, and root mean square error of cross validation (RMSECV).



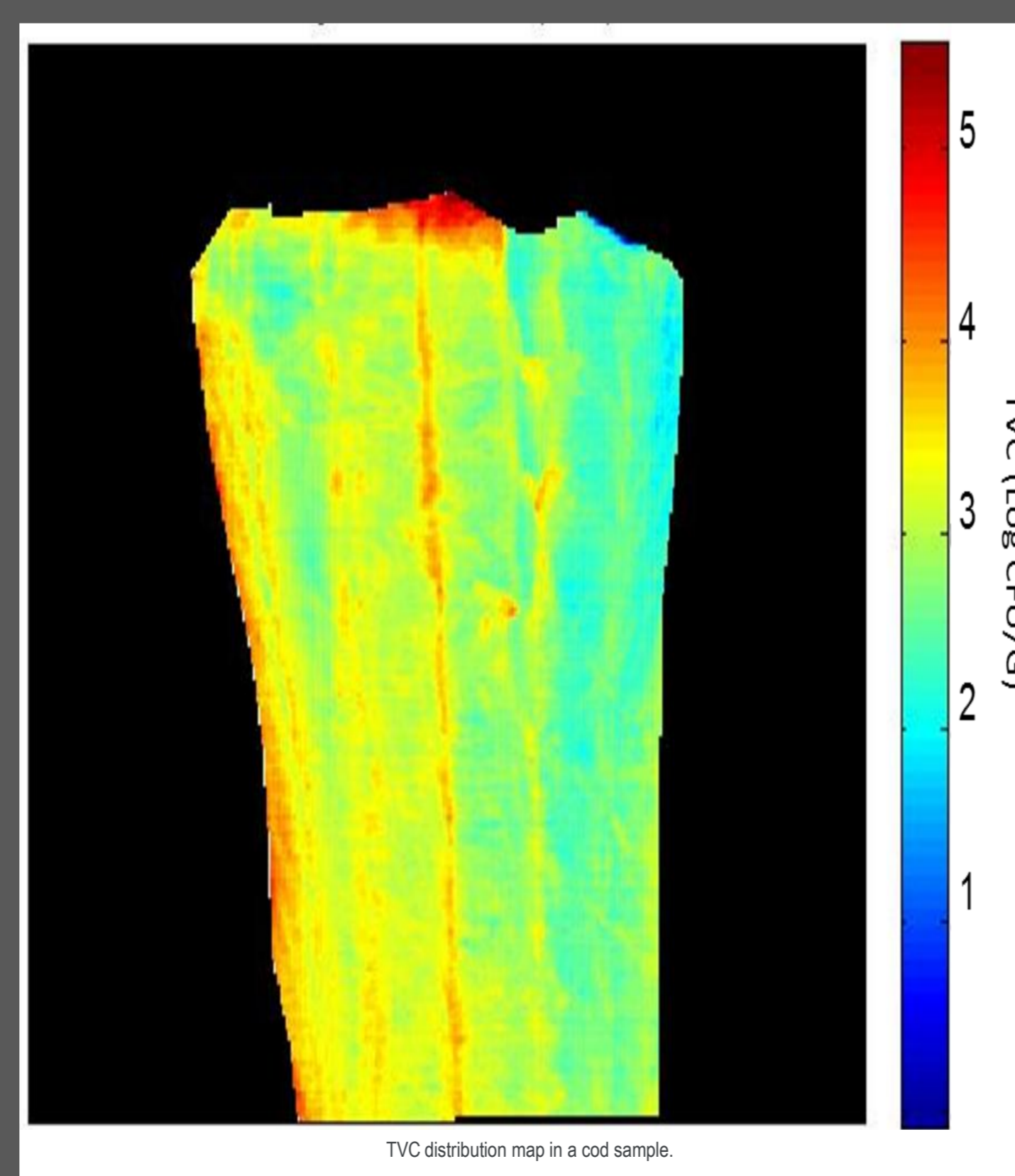
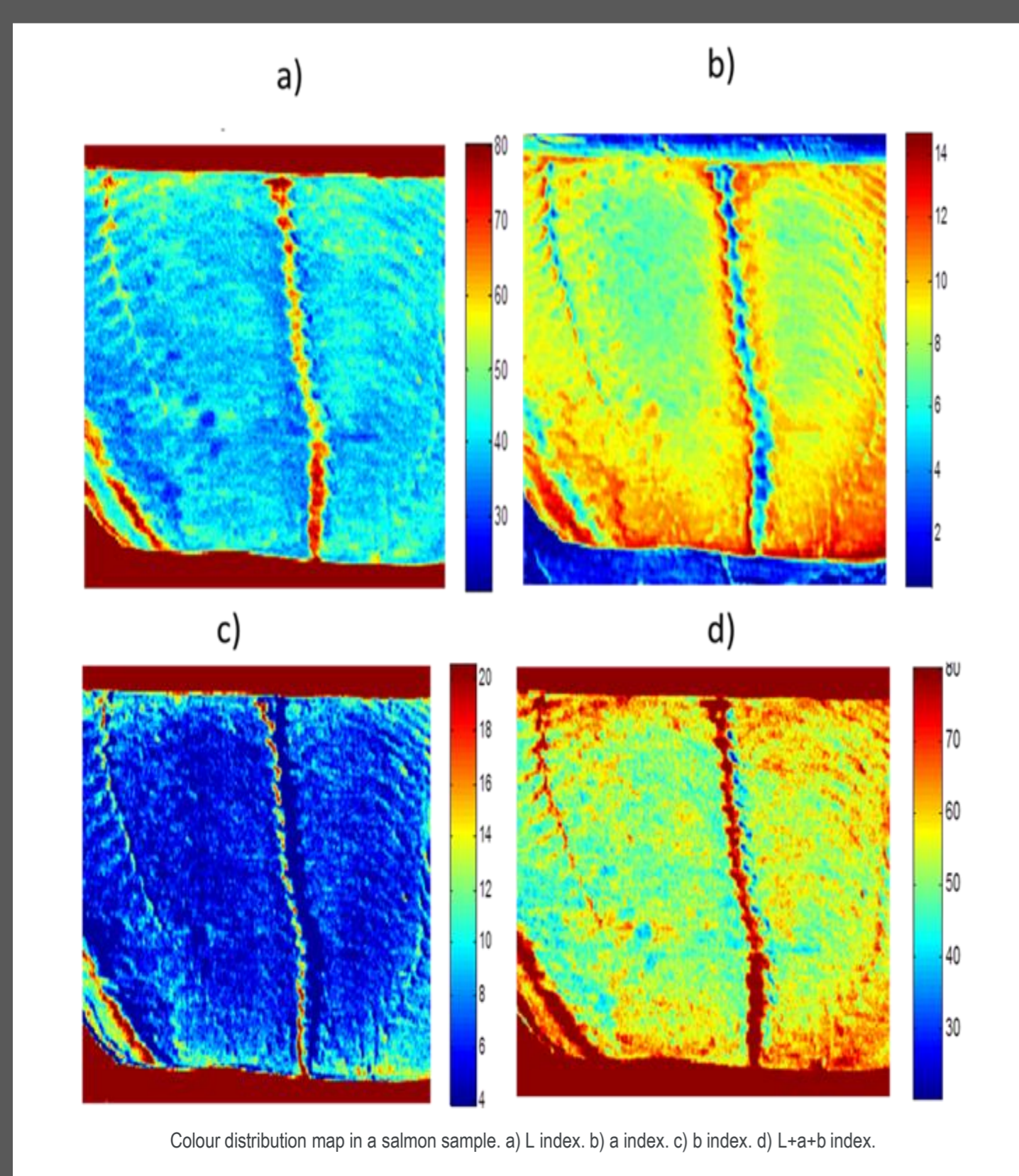
COD	N-TVB	TVC	WHC
Max	55.77	6.45	30
Min	4.44	0.13	9
Mean	14.57	3.46	19
Standard Deviation	8.43	1.07	5

SALMON	L	a	b	K-Index	Fat	WHC
Max	64.93	14.72	16.84	85	21.73	36.85
Min	19.82	6.34	3.48	-0.24	2.02	6.75
Mean	40.53	10.21	7.52	48.54	8.42	15.82
Standard Deviation	4.47	1.35	1.89	24.88	4.24	5.53

Table 1&2. Reference values for cod and salmon samples

Model	COD						SALMON							
	PLS regression			SVM regression			PLS regression			SVM regression				
Parameter	TVC	WHC	N-TVB	TVC	WHC	N-TVB	L+a+b	WHC	Fat	K-index	L+a+b	WHC	Fat	K-index
R^2 CV	0.68	0.74	0.81	0.57	0.65	0.78	0.66	0.75	0.66	0.74	0.52	0.58	0.55	0.6
RMSECV	0.87	2.37	4.36	1.03	3.44	5.61	2.32	2.58	2.65	13.12	6.10	2.97	3.73	15.32

Table 3. Pixel-Based PLS and SVM models for each parameter



CONCLUSIONS:

-Models have been built and used for the prediction of unknown samples

-A prediction value for each parameter can be assigned to each scanned sample by averaging the values predicted at pixel level.

- The information can be used for prompt on-line sorting purposes in the fish industry.