A dynamic data-driven decision support for aquaculture farm closure

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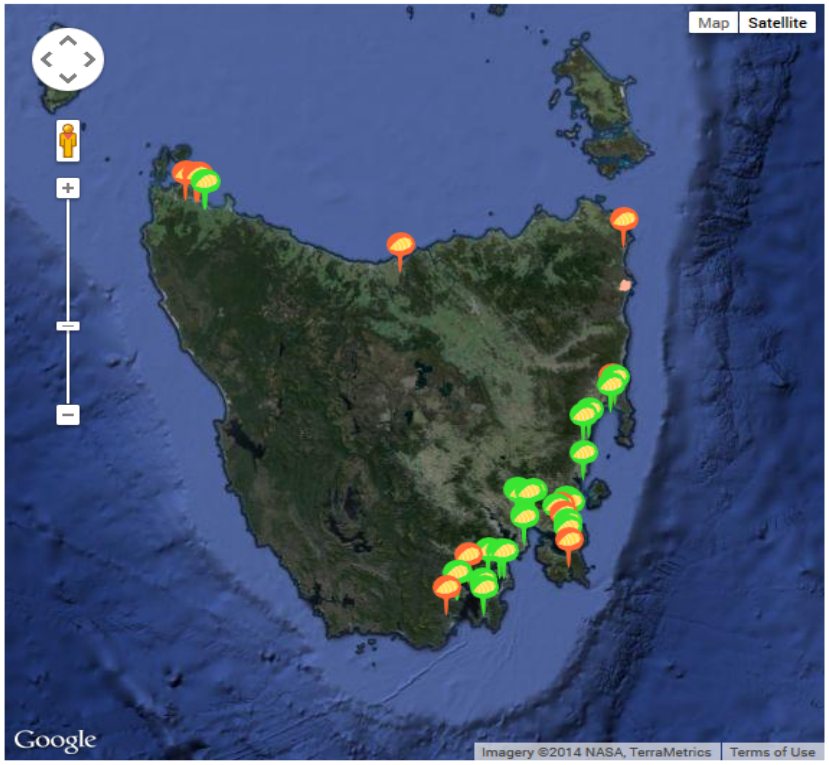
Background-TSQAP

Moulting Bay

Home Areas Zones Tools Reports About



Summary

Search:

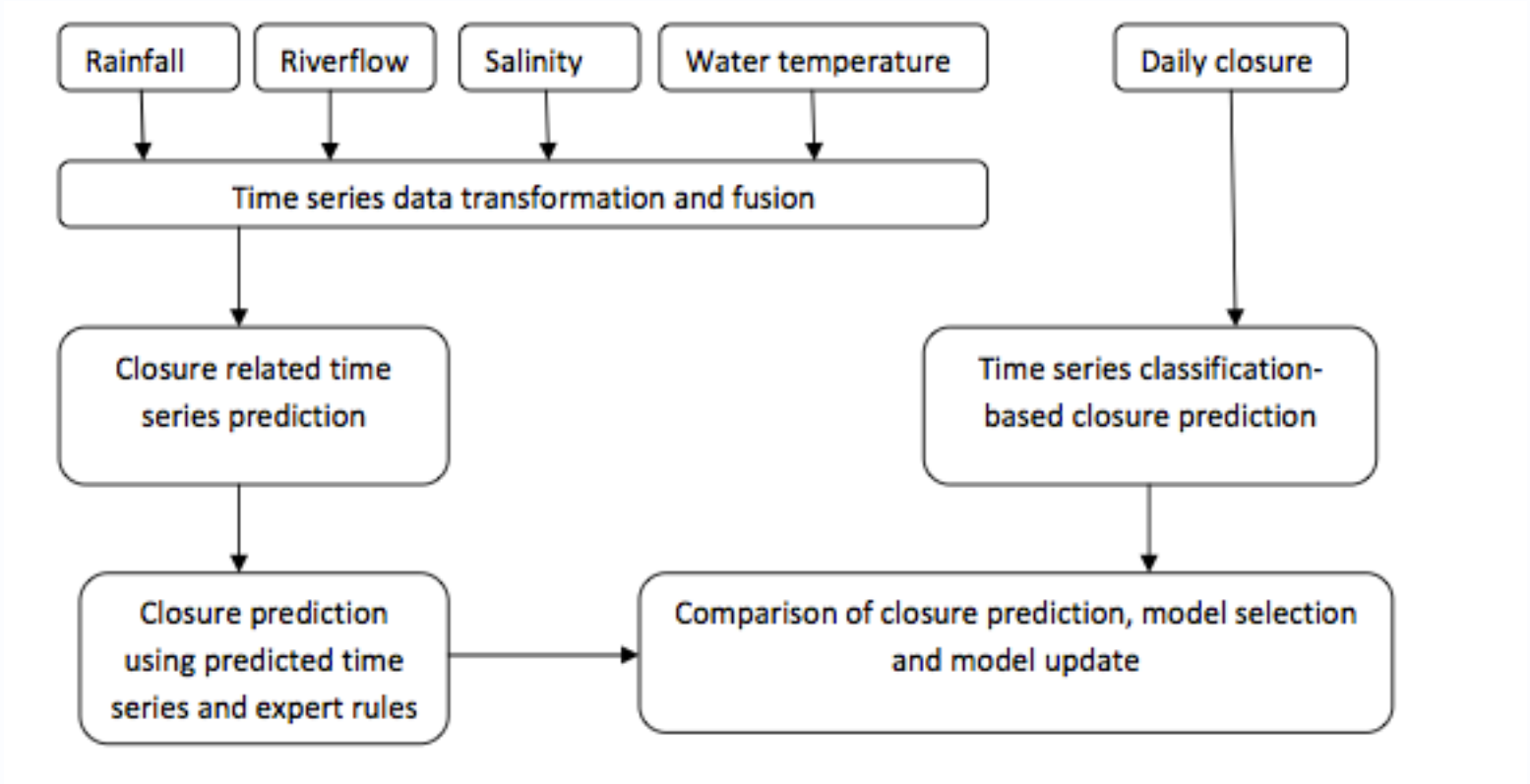
Area	Zone	Domestic	General	EU	Japan	Actions
Moulting Bay	1	Closed	Closed	Closed	Closed	
Moulting Bay	2	Closed	Closed	Closed	Closed	
Moulting Bay	GB1	Closed	Closed	Closed	Closed	
Moulting Bay	4	Closed	Closed	Closed	Closed	
Moulting Bay	5	Closed	Closed	Closed	Closed	
Moulting Bay	6A	Closed	Closed	Closed	Closed	
Moulting Bay	GB2	Closed	Closed	Closed	Closed	

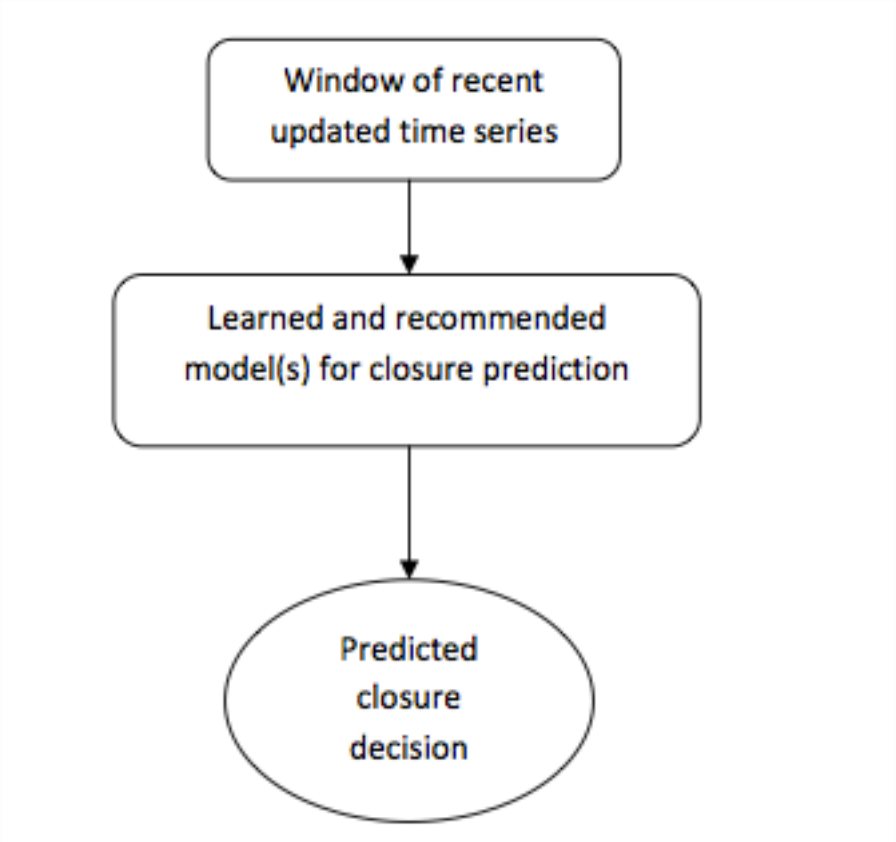
Importance of closure as decision support

1. DHHS-public health
2. Shellfish farms-management

Closure decisions (Open/Close)

1. Now-casting
2. Forecasting/prediction: 1 to n days ahead
   - Time series classification
   - Predicting relevant environmental variables/time series and then applying TSQAP rules on the predicted value as simple classifier


Rainfall
Riverflow
Salinity
Water temperature
Daily closure
Time series data transformation and fusion
Closure related time series prediction
Time series classification-based closure prediction
Closure prediction using predicted time series and expert rules
Comparison of closure prediction, model selection and model update


Window of recent updated time series
Learned and recommended model(s) for closure prediction
Predicted closure decision

Time series classification

Date	Rainfall	River flow	...	Status
01-01-2012	1	0.5		Open
02-01-2012	20	1		Open
03-01-2012	10	8		Close
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
01-02-2013	2	2	...	Open

Time series prediction

Date	Rainfall	River flow	...	Status
01-01-2012	1	0.5		Open
02-01-2012	20	1		Open
03-01-2012	10	8		Close
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
01-02-2013	2	2	...	Open

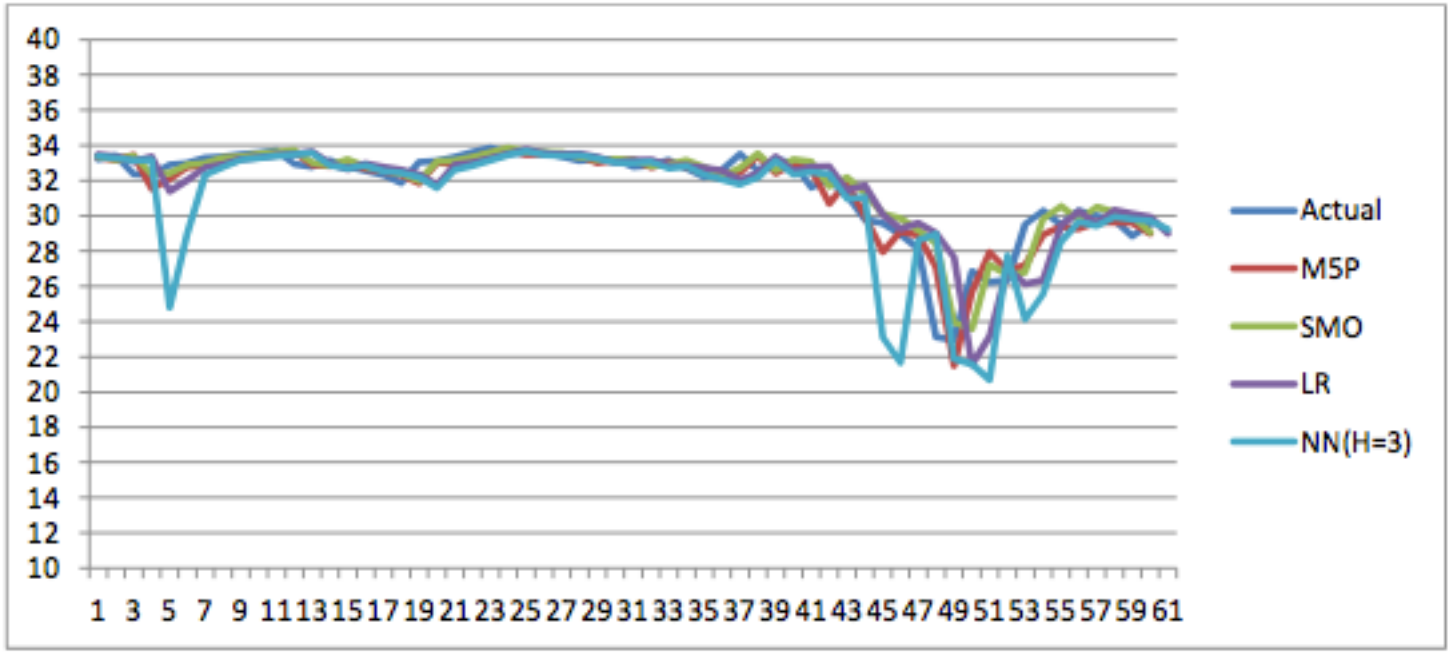
Tasks/issues in time series prediction

1. River flow/stream flow-Hydrology: Geology, other factors
2. Salinity: Poor quality data, needs more variables (water temperature)
3. Modelling for individual locations
   - Lag days
   - Input variables
4. Many rules...

Time series prediction model for salinity
Test case: 1/07/2012 to 31/08/2013.

Technique	Lag days(River flow-Rainfall-Water temperature-Salinity)	MSE
M5P	1-1-1-3	0.361
SMOReg	1-1-3-1	0.365
LR	1-2-2-1	0.375
NN (Hidden layer=3)	2-1-1-1	0.395

Prediction result



Using expert rules on prediction

Salinity<30 PSU

	Closed	Opened
Closed	14	7
Opened	3	36

Time series classification

	Closed	Opened
Closed	17	4
Opened	8	31

Ongoing and future work

1. Data-driven models are implemented
2. Visualization of closure status is being implemented
3. Relocating models to other locations

Thank you