Conflict Prediction and Machine Learning

Anh Le

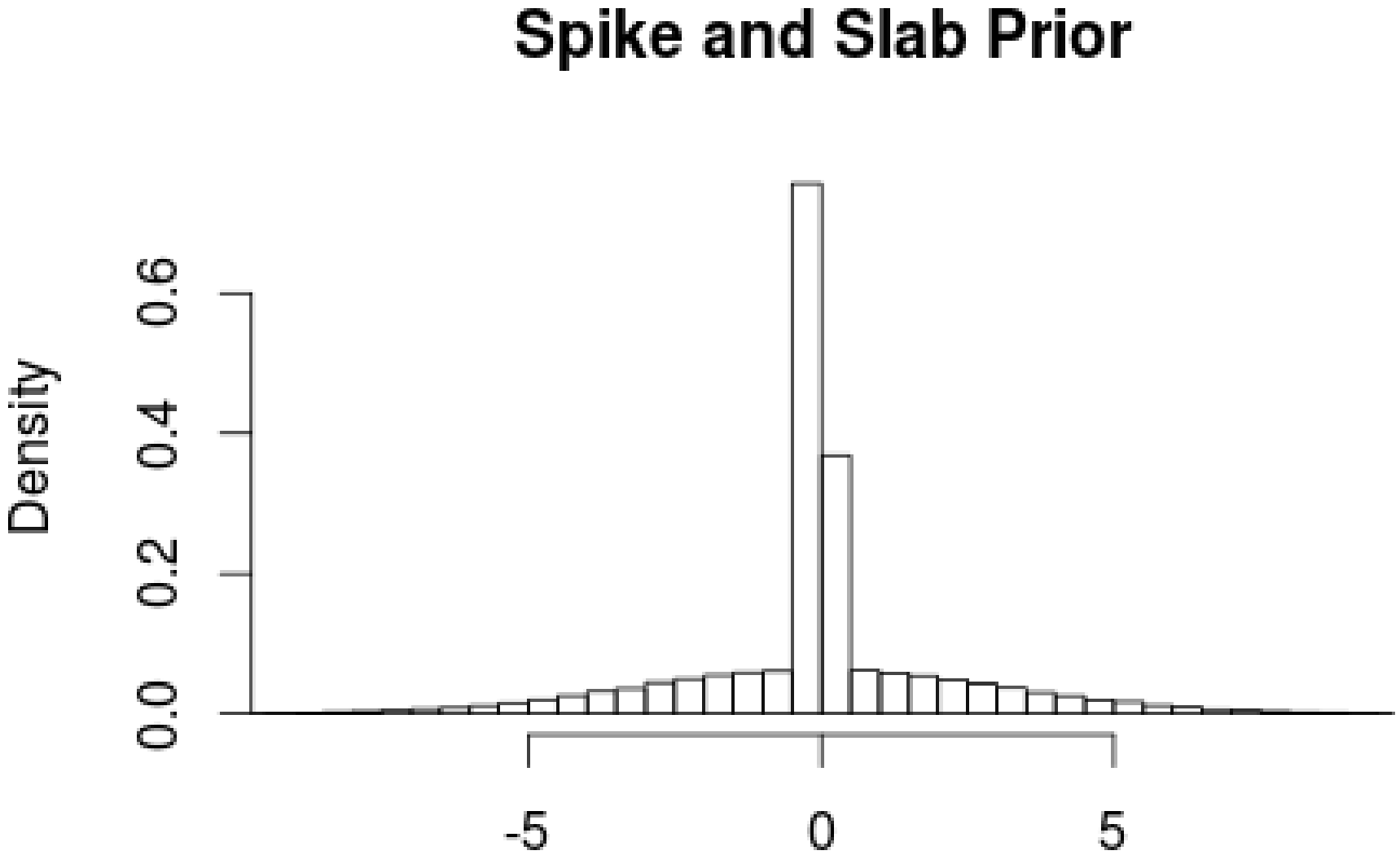
Duke University

anh.le@duke.edu

February 26, 2015

Overview

Spike and Slab model



Model performance (with country dummies)

	insurgency	rebellion	dpc	erv	mp
brier	0.008	0.020	0.097	0.033	0.024
auc.C	0.998	0.930	0.865	0.975	0.801
precision	0.976	0.907	0.544	0.907	0.647
recall	0.946	0.789	0.548	0.490	0.147

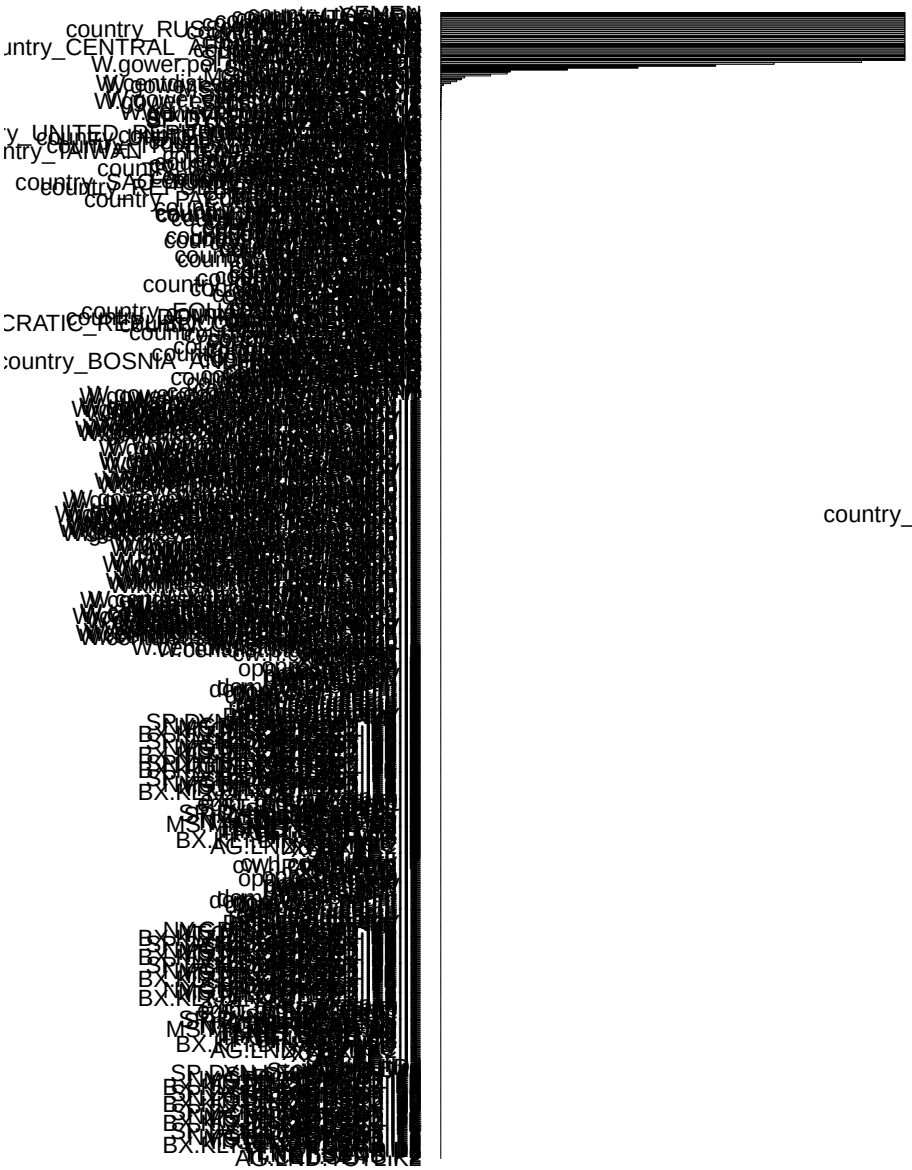
Table: Spike and Slab (out-sample)

	insurgency	rebellion	dpc	erv
brier	0.06	0.03	0.12	0.03
auc.C	0.94	0.97	0.78	0.93

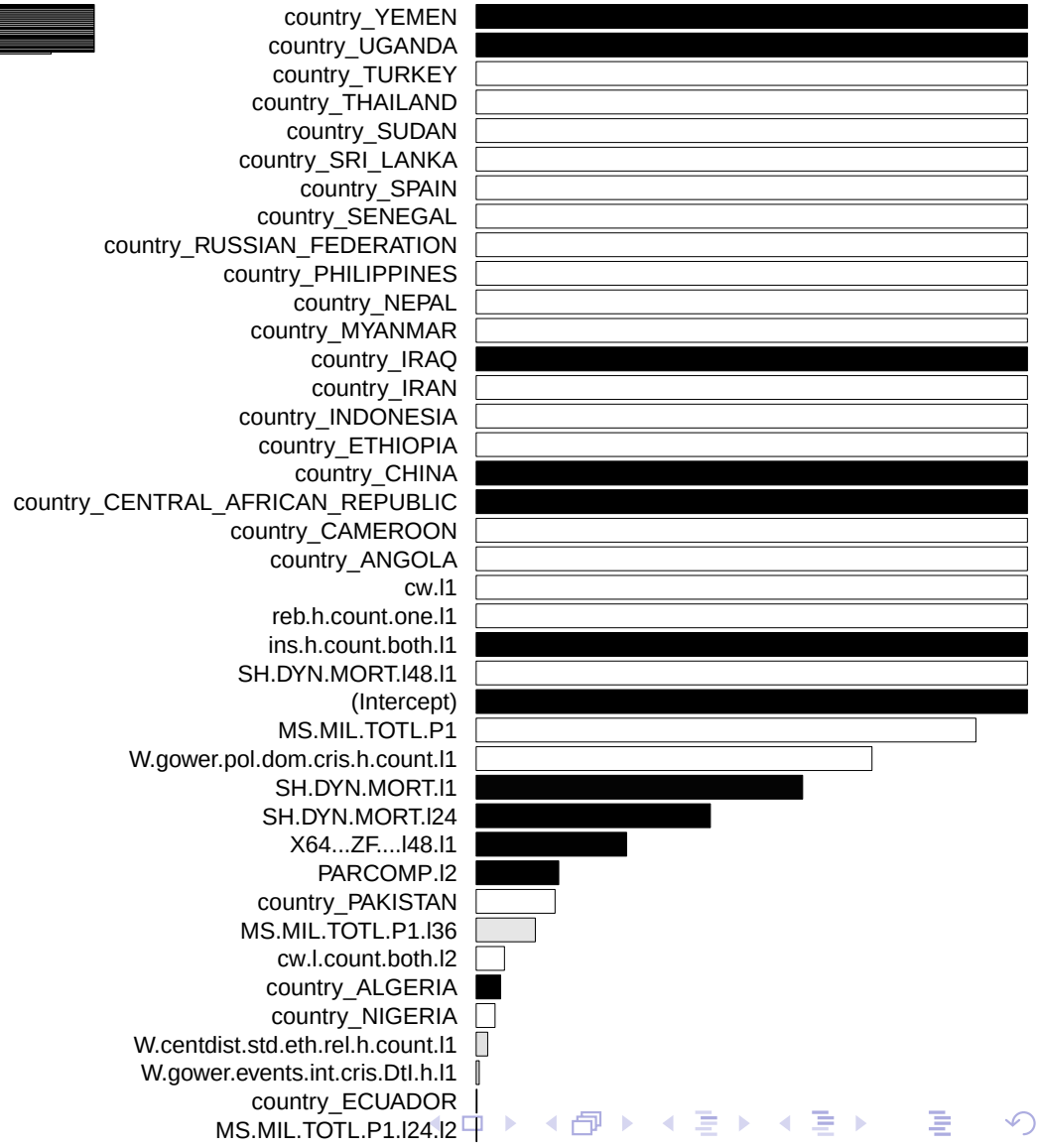
Table: EBMA (out-sample)

Variable selection (rebellion)

rebellion : all variables



rebellion : variables with inclusion prob > 0.0



Model performance (without country dummies)

	insurgency	rebellion	dpc	erv	mp
brier	0.008	0.020	0.097	0.033	0.024
auc.C	0.998	0.930	0.865	0.975	0.801
precision	0.976	0.907	0.544	0.907	0.647
recall	0.946	0.789	0.548	0.490	0.147

Table: With dummies (out-sample)

	insurgency	rebellion	dpc	erv	mp
brier	0.080	0.057	0.167	0.037	0.049
auc.C	0.886	0.895	0.688	0.922	0.704
precision	0.519	0.575	0.162	0.508	0.097
recall	0.778	0.586	0.458	0.504	0.033

Table: Without dummies (out-sample)

Boosted classification tree

- Fit an initial tree
- Get the residuals, fit another tree to the residual
- Add (part of)the new tree to the existing tree
- Tune 1) the number of trees, 2) how much of the new tree to add back to the old tree, 3) the complexity of each tree

So the algorithm can learn *slowly*

Boosted tree result

	insurgency	rebellion	dpc	erv	mp
brier	0.006	0.005	0.039	0.032	0.033
auc.C	0.997	0.999	0.947	0.980	0.854
precision	0.971	0.966	0.715	0.533	0.505
recall	0.964	0.970	0.516	0.926	0.114

Table: Boosted tree (in-sample)

	insurgency	rebellion	dpc	erv	mp
brier	0.008	0.012	0.088	0.037	0.027
auc.C	0.996	0.984	0.901	0.956	0.830
precision	0.971	0.958	0.594	0.668	0.571
recall	0.963	0.865	0.725	0.722	0.160

Table: Boosted tree (out-sample)

Boosted tree does very well even without dummies

It performs as well as, if not better than, regression with country dummies.

	insurgency	rebellion	dpc	erv	mp
brier	0.008	0.020	0.097	0.033	0.024
auc.C	0.998	0.930	0.865	0.975	0.801
precision	0.976	0.907	0.544	0.907	0.647
recall	0.946	0.789	0.548	0.490	0.147

Table: Spikeslab with dummies (out-sample)

	insurgency	rebellion	dpc	erv	mp
brier	0.008	0.012	0.088	0.037	0.027
auc.C	0.996	0.984	0.901	0.956	0.830
precision	0.971	0.958	0.594	0.668	0.571
recall	0.963	0.865	0.725	0.722	0.160

Table: Boosted tree without dummies (out-sample)