**NeuroMiner changes for NM 1.0 (Elessar) Release**

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| **NM functionalities requiring update** | **Function** | **Status** |
| Corrected training of LIBSVM models with probability outputs as LIBSVM is internally swapping the labels in probability mode. This led to probabilities being swapped as well. Now the “-1” labels are relabeled as “2” internally before the SVM is trained. | nk\_GetParam2\_LIBSVM.m | Done |
| Implement temporary matrix removal of cases that consist completely of NaNs. This applies to preprocessing, training, and visualization modules. This new functionality makes the maximum number of training subjects available in stacking and late fusion approaches and allows to run imputation in stacking scenarios | \* nk\_ManageNanCases.m  nk\_GetParam2.m  nk\_GetTestPerf.m  nk\_PerfPreprocess.m | Done |
| Improved NaN information (case- and feature-wise analysis) in the Data input interface | nk\_SelectVariateIndex.m | Done |
| Remove dependent extract dimensionality module when user removes dimensionality reduction module. | nk\_Preprocess\_config.m | Done |
| Adjust Preprocessing configurator to stacking scenario (No image ops allowed, Imputation module always allowed) | nk\_Preprocess\_config.m | Done |
| Bug causing smoothing of weighting maps to be ignored during preprocessing | nk\_PreprocessPrep.m | Done |
| Extend standardization module to different types of standardization/normalization, including mean centering, l1-median standardization, qn-standardization and sn-standardization | nk\_Standardize\_config.m  nk\_PerfStandardizeObj.m | Done |
| Extend NMF dimensionality reduction method to include different NMF techniques such as standard, sparse and orthogonal NMF | nk\_DimRed\_ main\_config.m | Done |
| Include PLS as dimensionality reduction method in the Preprocessing configurator. Side labels can be provided to sensitize the covariance computation to a given subspace in the data. | nk\_DimRed\_main\_config.m  nk\_PerfRedObj.m  nk\_PLS.m | Done |
| Implement PLS-based deviation mapping as new preprocessing module. The module allows to train a normative covariance model based on a subset of the data which is then used to compute deviation maps for the samples (Ydiff = Yorig – Yrecon). The covariates should be only those provided at the NM data input step. | nk\_Preproc\_config.m  \*nk\_PerfPLSObj.m  nk\_PerfPreprocessingObj.m  nk\_GetParamDescriptions2.m  nk\_Preprocess\_StrCfg.m  nk\_VisXWeight.m  \*nk\_DevMap\_config.m  nk\_GenPreprocSequence.m | In progress |
| **Brainmask issue:** When the brainmask has been accidentally deleted or when NM is used in external validation mode where brainmask does not exist, NM is now able to recreate a temporary brainmask file from an internally saved version. If this internal brainmask image does not exist (previous NM versions), the application will ask for an update of the brainmask path during data input. | ReadNifti.m  DataIO.m  nk\_CompatY.m  nk\_ReturnSubSpaces.m  nk\_TransferModality.m  nk\_PerfSpatFilt2.m  \*WriteTempVol.m  \*DeleteTempVol.m | Done |
| Remove bug when labels are not available in OOCV data and multi-group models are used for out-of-training prediction | nk\_OOCV.m | Done |
| Remove bug when entering OOCV matrix data from MATLAB workspace and feature names are not present (‘s\_featnames problem’) | CheckTabFile.m | Done |
| Remove display bug when selecting pre-computed VisDatamats or OOCVdatamats in the respective “Prep”-menus | nk\_VisModelsPrep.m  nk\_OOCVPrep.m | Done |
| Remove bug in nk\_PerfPreprocessingObj.m which caused weighting maps to not be copied to preprocessing data shelves. | nk\_PerfPreprocessingObj.m | Done |
| Re-activate PLS ranking /weighting module in the Preprocessing configurator. Works only for one label (binary classification / regression) | nk\_Rank\_config.m  nk\_PerfFeatRankObj.m  nk\_PLS.m | Done |
| Select Analysis Quick Menu | nk\_SelectAnalysis | Done |
| Visualization module crashes when trying to access permutation-based P values in the Results Viewer | display\_visual | Done |
| Training module crashes when using intermediate data fusion | nk\_MLOptimizerPrep.m nk\_GenCVdataMaster2.m | Done |
| In pipelines involving dimensionality reduction steps, map given CV1 component solution to a template factor solution through reordering of CV1 components | \* nk\_ReorderComponents.m  nk\_VisModels.m | In progress |
| Multiple visualization crashes when using permutation mode in multi-group / data-fusion modes | nk\_VisModels.m | Done |
| Visualization module not working properly for pipelines producing CV1 feature mask stacks instead of single CV1 feature masks | nk\_VisModels.m | Done |
| Implement Model P histogram viewer in NM Results Inspector | display\_visual.m  load\_selModality.m | Done |
| Improve Matrix Inspector to show the feature names interactively. By clicking on a feature, the feature should be selected in multi-select list.  Improve Matrix Inspector to enable the selection of cases when importing the first modality | nk\_ItemSelector.m  nk\_ItemSelector.fig | Done |
| Implement menu-based mass results export in NM results viewer to print single-subject predictions, prediction performance and feature visualization results to disk. | export\_scores.m\*  export\_features.m  export\_performance.m\*  nk\_PrintResults2.m  switch\_analysis.m\*  load\_analysis.m  load\_SelAnalysis.m  display\_visual.m  tbl2file.m  create\_visdata\_tables.m\*  perf\_display.m | Done |
| Improve Matrix Inspector to allow for interactive case selection. Fix bug when cases selection has been performed and Matrix Inspector is used again to select different features. | nk\_ItemSelector.m  nk\_ItemSelector.fig | Done |
| Import OOCV data when no labels are available or columns have been unselected in the Matrix Inspector when importing training & CV data | DataIO.m | Done |
| Revise OOCV module to write out results for each CV2 partition. In addition, provide similar menu-based interface as for Visualization Module. | nk\_OOCVPrep.m  nk\_OOCV.m | Done |
| Revise OOCV module to enable stacking in the OOCV setting | nk\_OOCV.m  nk\_PerfPreprocessMeta.m  nk\_OOCVprep.m | Done |
| Revise OOCV module to enable late fusion in the OOCV setting | nk\_OOCV.m  nk\_OOCVPrep.m | Done |
| Revise OOCV and Visualisation module to (a) save preprocessing parameters and models to disk and (b) later use them to eliminate the need of recomputing everything. This is particularly important for the OOCV module because it allows for the sharing of models without sharing data (see below: data scrambling) | nk\_ApplyTrainedPreproc2.m  nk\_PerfPreprocess.m  nk\_PerfPreprocessMeta.m  nk\_OOCV.m  nk\_VisModels.m  \*nk\_ReturnAtOptPos.m | Done |
| Implement OOCV results view in NM Results Viewer | nk\_PrintResults2.m nk\_PrintResults2.fig | Done |
| Implement OOCV predictions export mechanism in NM Results Viewer |  | Done |
| Implement data scrambling to enable model sharing without data sharing for external validation | nm.m  nk\_OOCVPrep.m | Done |
| Harmonize subset selection identification (always ask user to provide boolean vector). | all configuration functions where subset selection is possible | Not started |
| Scripting / Batch interface to Preprocessing, Training, Visualization and OOCV modules to enable HPC computations and wrapping of NeuroMiner into MATLAB scripts | nk\_MLOptimizer\_batch.m implemented and tested.  nk\_Preprocess\_batch.m implemented and tested.  nk\_VisModels\_batch needs to be implemented  nk\_OOCV\_batch needs to be implemented  Bash scripts must be adapted to SGE environment | Done |
| Revise directionality of all performance and reliability thresholds in NM to be ‘greater is better’ |  | Done |
| Probabilistic Feature Selection |  | Done |
| Regularization of model selection |  | Not started |
| Remove bug in NM Results Viewer when switching between analyses having visdata/OOCV data and no visdata/OOCV data |  | Done |
| Integrate Model P values inspector into NM Results Viewer |  | Done |
| Implement late-fusion results page in viewer | Both predictions are now accessible as well as summary plots comparing unimodal predictors against bagged performance measures. | Done |

**NeuroMiner 1.1 New Feature List**

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| **NM functionalities requiring update** | **Function** | **Status** |
| Implement mixed-mode stacking option to allow mixing of original data and higher-level predictions in meta-learning setup. | Will not be included in NM 1.0 | Not started |
| Implement hierarchical stacking / data fusion in NM | Will not be included in NM 1.0 | In progress |
| Implement Bayesian optimization methods for large parameter spaces | Will not be included in NM 1.0 | Not started |