# Appendix C.1: Summary of Currently Available Methods in XCast

This table summarizes the currently available estimators, transformers, and functions in XCast. XCast data structures each wrap an underlying single-point utility (i.e., function, estimator, or transformer), which may or may not come from a third-party Python data science library. The sources of the underlying single-point utilities are indicated here. Custom single-point utilities implemented in XCast are marked as “XCast”. In the cases where a single-point utility is implemented in a third-party library, but significantly modified in XCast, both boxes are marked.

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| --- | --- | --- | --- | --- | --- |
|  | **Python Library** | | | | |
|  | Scikit-Learn | SciPy | Statsmodels | OpenCV | XCast |
| **XCast Estimators** | | | | | |
| Ensemble Mean (EM) |  |  |  |  | **X** |
| Bias Corrected Ensemble Mean (BCEM) |  |  |  |  | **X** |
| Multiple Linear Regression (MLR) | **X** |  |  |  |  |
| Poisson Regression (PR) | **X** |  |  |  |  |
| Gamma Regression (GR) | **X** |  |  |  |  |
| Multi-Layer Perceptron (MLP) | **X** |  |  |  |  |
| Random Forest (RF) | **X** |  |  |  |  |
| Ridge Regression (Ridge) | **X** |  |  |  |  |
| Extreme Learning Machine (ELM) |  |  |  |  | **X** |
| Member Count (MC) |  |  |  |  | **X** |
| Multivariate Logistic Regression (MLOR) |  |  | **X** |  |  |
| Extended Logistic Regression (ELR) |  |  | **X** |  | **X** |
| Naïve Bayes (NB) | **X** |  |  |  |  |
| Probabilistic Output ELM (POELM) |  |  |  |  | **X** |
| **XCast Transformers** | | | | | |
| Principal Components Analysis (PCA) | **X** |  |  |  |  |
| Spatial Principal Components Analysis (EOF) | **X** |  |  |  |  |
| Non-Negative Matrix Factorization (NMF) | **X** |  |  |  |  |
| Factor Analysis (FA) | **X** |  |  |  |  |
| Dictionary Learning (DL) | **X** |  |  |  |  |
| Minmax Scaling (MinMax) |  |  |  |  | **X** |
| Standard Anomaly Scaling (Normalization) |  |  |  |  | **X** |
| One-Hot Encoding (OHE) |  |  |  |  | **X** |
| **XCast Functions** | | | | | |
| Interpolation (Regridding) |  | **X** |  |  |  |
| Gaussian Kernel Smoothing (GKS) |  |  |  | **X** |  |
| Cross Validation (XVAL) |  |  |  |  | **X** |
| Brier Score Loss (BSL) | **X** |  |  |  |  |
| Rank Probability Score (RPS) |  |  |  |  | **X** |
| Continuous Rank Probability Score (CRPS) |  |  |  |  | **X** |
| Ignorance (IGN) |  |  |  |  | **X** |
| Point-Biserial Correlation (PBC) |  | **X** |  |  |  |
| Hansen-Kuiper (HK) |  |  |  |  | **X** |
| Mean Absolute Percentage Error (MAPE) | **X** |  |  |  |  |
| Kendall’s Tau (KT) |  | **X** |  |  |  |
| Bayesian Information Criterion (BIC) |  |  |  |  | **X** |
| Akaike Information Criterion (AIC) |  |  |  |  | **X** |
| Log Likelihood (LL) |  |  |  |  | **X** |
| Receiver Operating Characteristics Area Under Curve (ROC AUC) | **X** |  |  |  |  |
| Generalized Receiver Operating Characteristics (GROC) |  |  |  |  | **X** |
| F1 Score (F1) | **X** |  |  |  |  |
| Average Precision (AP) | **X** |  |  |  |  |
| Index of Agreement (IOA) |  |  |  |  | **X** |
| Nash-Sutcliffe Efficiency (NSE) |  |  |  |  | **X** |
| Kling-Gupta Efficiency (KGE) |  |  |  |  | **X** |
| Spearman’s Correlation Coefficient (Spearman) |  | **X** |  |  |  |
| Spearman’s P-Statistic (SpearmanP) |  | **X** |  |  |  |
| Pearson’s Correlation Coefficient (Pearson) |  | **X** |  |  |  |
| Pearson’s P-Statistic (PearsonP) |  | **X** |  |  |  |