1.Title of Research Paper:
Machine Learning Approach for Predicting Systemic Lupus Erythematosus in an Oman-Based Cohort

AI Methods/Models Used:

- CatBoost (Gradient Boosting Algorithm)
- SHAP (SHapley Additive exPlanations) for model interpretability
- Recursive Feature Elimination (RFE) for feature selection
- Comparison with Random Forest, Support Vector Machine (SVM), and Multi-layer Perceptron

Brief Intuition for Technique:
Use RFE for feature selection, CatBoost to get what external indication should be used for identifying SLE, and SHAP for explaining the disorders selected by CatBoost

Keywords:
Systemic Lupus Erythematosus, Machine Learning, CatBoost, SHAP, Clinical Decision Support System, Oman, Predictive Modeling, Feature Selection, Autoimmune Disease

Comments:

They understood that using interpret able models for such cases helps physicians to validate their findings or have discussions, which should be the ideal way to go. Applying on larger data sets may not ensure accuracy, need to make country or region specific models.

https://drive.google.com/file/d/1tTjyZdkxhfQ5V9lnmsRuNtLGaQKvKNb2/view?usp=drive_link

2.**Title of Research Paper:**
Comparing two machine learning approaches in predicting lupus hospitalization using longitudinal data

AI Methods/Models Used:

- **Differential Approach** (for non-temporal models like Decision Trees, Random Forest, Logistic Regression, Neural Networks)
- **Long Short-Term Memory (LSTM)** network (for temporal data)

Brief Intuition for Technique:
The paper compares two approaches for predicting hospitalizations in lupus patients using longitudinal data:

- **Differential Approach**: Introduces lagged variables between consecutive time steps to model disease progression. This method works with any non-temporal machine learning models and is effective for short observation periods.
- **LSTM**: A type of Recurrent Neural Network designed to handle sequential data, capturing long-term dependencies. LSTM excels with long observation periods, making it ideal for scenarios requiring longer-term monitoring.

Keywords:
Systemic Lupus Erythematosus, Machine Learning, Longitudinal Data, LSTM, Differential Approach, Hospitalization Prediction, Temporal Data, Class Imbalance

Comments: A new approach is introduced here, highlighting the significance of feeding the model temporal data, that will take into account the progression of the disease and its symptoms, to provide for more accurate results.

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3. Title of Research Paper:
Exploration of biomarkers for systemic lupus erythematosus by machine-learning analysis

AI Methods/Models Used:

- **Random Forest (RF)**
- **Support Vector Machine with Recursive Feature Elimination (SVM-REF)**
- **Least Absolute Shrinkage and Selection Operator (LASSO)**

Brief Intuition for Technique:
RF, SVM-REF, and LASSO algorithms were applied to select significant genes from a pool of differentially expressed genes (DEGs). The final key genes were validated using external datasets and real-time quantitative PCR (RT-qPCR) to ensure reliability.

Keywords:
Systemic Lupus Erythematosus, Machine Learning, Biomarkers, Random Forest, LASSO, SVM-REF, Gene Expression, RT-qPCR

Comments:

Similar to previous papers , I can see a trend of either detecting SLE at the genetic level, using RF based ,models to find out relevant genes, or using symptom analysis using other models. A combination of both such techniques has been applies in this paper.

4. Early intervention in systemic lupus erythematosus:time for action to improve outcomes and health-care utilization

This is an editorial article talking about the current state of early onset SLE detection, and the need to imporve on techniques to further better patients live. No AI models as such have been mentioned

5.**Title**
Application of Machine Learning Models in Systemic Lupus Erythematosus

AI methods used

1. Decision Trees
2. Random Forest
3. Support Vector Machines (SVM)

4. Logistic Regression
5. Artificial Neural Networks (ANN)
6. Cluster Analysis
7. ReliefF Algorithm
8. K-Means Clustering
9. XGBoost
10. Partial Least Squares (PLS)
11. Mask R-CNN
12. LSTM (Long Short-Term Memory)

Brief intuition behind the methodology

Same as before , a random forest based approach is used to detect the biomarkers, but unlike before a ANN based technique is used to classify and validate among healthy and sick patients.

Keywords

Systemic Lupus Erythematosus, Artificial Intelligence, Machine Learning Models, Diagnosis, Prognosis, Lupus Nephritis, Neuropsychiatric SLE, Cluster Analysis, Random Forest, Support Vector Machines

Comments:

This paper focusses on highlighting the importance of using Machine learning models for SLE detection, as has provided a summary of some models used in the past for detecting SLE and other related diseases, as well as the relevance to of each model with respect to SLE analysis. A trend of using RF and CatBoost or XGBoost (classifying models) used together has been seen.