



ARTIFICIAL INTELLIGENCE DIAGNOSTIC APPROACH OF INFERTILITY IN CHINESE TRADITIONAL MEDICINE

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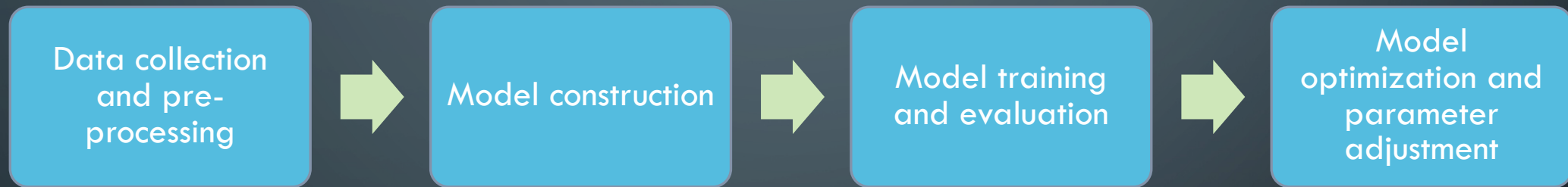
INFERTILITY

- Infertility is a kind of reproductive disorder that frequently occurs among young couples.
- Infertility is the failure to pregnant after one year of sexual behaviors. As it gradually drew more public attention, it was addressed infertility as nonnegligible since it induces severe social conflicts, like family violence, divorce, social stigma, emotional stress, depression, anxiety, and low self- esteem.
- According to World Health Organization (WHO) data, forty-eight million couples and 186 million people worldwide will be infertile by 2022.

AI APPROACH TO THE MEDICAL FIELD

- As modern medicine developed, countless examples of Artificial Intelligence (AI) in medical uses emerged since AI techniques satisfy the requirements of accurately dealing massive numerical data. Currently, AI commonly appears in ultrasound, magnetic resonance imaging, mammography, genomics, and computed tomography

PROJECT STAGES



DATA-PREPROCESSING

- We collected 600 valid cases from female infertility case records in the Gynecological Clinic of Traditional Chinese Medicine in China Rehabilitation Research Center Beijing Boai Hospital from October 2018 to March 2022 in the form of Excel.
- Data pre-processing includes missing value processing, classified data processing, feature selection, and extraction.

METHODS (MODEL CONSTRUCTION)

- We used six machine learning approaches-Logistic Regression, Linear Discriminant Analysis, K Nearest Neighbors, Support Vector Machine, Artificial Neural Network-to solve the problem.
- In this project, I chose to develop web pages based on the Streamlit framework and Python language, using the Jupyter Notebook and Pycharm of the Anaconda platform.

MODEL TRAINING AND EVALUATION

- We used k-fold cross-validation to train the models; there are 480 samples in the training group, and the test dataset containing 120 samples that were used for verification.
- Accuracy, Precision, Recall, and their weighted average F1-score are used for evaluating the model's performance. Both the precision and recall rates are calculated using *The Confusion Matrix*

MODEL ADJUSTMENT AND OPTIMIZATION

- Grid Search Hyperparameters is used to adjust parameters suited for each model.
- Data Enhancement - we used the Synthetic Minority Oversampling Technique (SMOTE) of the Imbalanced-Learn library for data enhancement.

CONCLUSION (PROGRESSES)

- We first constructed six models with an accuracy of around 0.8, according to the data provided by the Institution. After optimizations and model adjustments, the model accuracy becomes over 90%.
- The final accuracy and efficiency promised the feasibility of AI approach to help decide infertility syndrome type.

REFERENCE

“Infertility.” *World Health Organization*, World Health Organization

Kumar, Yogesh, et al. “Artificial Intelligence in Disease Diagnosis: A Systematic Literature Review, Synthesizing Framework and Future Research Agenda.” *Journal of Ambient Intelligence and Humanized Computing*, Springer Berlin Heidelberg, 13 Jan. 2022