Covenant College

PHY 492: Senior Integration Paper

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Machine Learning and

Stewardship

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**Outline**

1. Introduction
   1. Biblical Mandate of Stewardship
   2. Technology and the Creation Mandate
   3. Introduction to Artificial Intelligence?
      1. Introduction to Machine Learning
      2. Introduction to Deep Learning
   4. Building a Machine Learning algorithm
      1. Data Mining
      2. Data Pre-processing
      3. Building the model
      4. Evaluating the model
   5. The algorithms of interest in this paper
2. Algorithms
   1. Regression
      1. Simple Linear Regression
      2. Multiple Linear Regression
      3. Polynomial Regression
      4. Support Vector for Regression (SVR)
      5. Decision Tree Classification
      6. Random Forest Classification
      7. Evaluation between models for a given dataset
   2. Classification
      1. Logistic Regression
      2. K-Nearest Neighbors (K-NN)
      3. Support Vector Machine (SVM)
      4. Kernel SVM
      5. Naïve Bayes
      6. Decision Tree Classification
      7. Random Forest Classification
      8. Evaluation between models for a given dataset
   3. Clustering
      1. K-Means Clustering
      2. Hierarchical Clustering
      3. Evaluation between models for a given dataset
   4. Reinforcement Learning
      1. Upper Confidence Bound
      2. Thompson Sampling
      3. Evaluation between models for a given dataset
   5. Natural Language Processing
      1. Pre-process text data
      2. Create Bag of Words model
      3. Evaluate model for a given dataset
   6. Deep Learning
      1. Artificial Neural Network for Regression and Classification (ANN)
      2. Recurrent Neural Network for Time Series Analysis
         1. Long Short-Term Memory (LSTM)
      3. Evaluation between models
   7. Dimensionality Reduction
      1. Feature Selection
      2. Feature Extraction
         1. Principal Component Analysis (PCA)
         2. Linear Discriminant Analysis (LDA)
         3. Kernel PCA
   8. Model Selection
      1. K-Fold Cross Validation
      2. Grid Search
      3. XGBoost
   9. Societal Impact
      1. The future of Machine Learning
      2. Christianity and AI
         1. Fallen Nature of Man
         2. The Mandate
         3. Culture and Technology
3. Conclusion

Note: ALL items in red might not be written if SIP is too long.

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Biblical statement on AI: <https://www.jubilee-centre.org/blog/why-the-evangelical-statement-on-artificial-intelligence>

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Ethics in AI: <https://www.christianitytoday.com/news/2019/april/ai-artificial-intelligence-technology-statement-evangelical.html>

SVR: <https://core.ac.uk/download/pdf/81523322.pdf>

Random Forest Classification: <https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/BodyPartRecognition.pdf>

ANN:

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LDA: <https://sebastianraschka.com/Articles/2014_python_lda.html>