**A Survey of Deep Learning Techniques for Algorithmic Cryptocurrency Trading Outline**

1. Abstract
2. Introduction
3. Why is cryptocurrency interesting?
4. Brief history of modeling and algorithmic techniques in finance
5. Why algorithmic trading?
6. What are neural networks and why are they interesting?
7. What we hope to accomplish in this paper
8. Background and literature review
9. Statistical Modeling versus Machine Learning and some statistical techniques used pre-machine learning (*Machine Learning in Finance* pg. 16-17)
10. ANNs and their basic structure
11. ANNs applied to assets (my literature goes here)
12. Technical Indicators, Data Processing, and PCA
13. Examples of Technical Indicators
14. Explanation of the types/class of technical indicators used
15. Coins chosen and why, data timeframe, and labeling scheme
16. Example of a row of the X+label matrix
17. PCA
18. Detailed explanation of the paper
19. Using Technical Indicators to create our PCA dataframe
20. Running all the models
21. Comparing the models with backtesting with naïve trading strategies (strategies based off the TA themselves and Buy-and-Hold)
22. Classification/ANN Structures and Data Preparation for them
23. SARIMAX
24. Mathematical Formulation
25. Differencing
26. Autocorrelation
27. Moving Average
28. Seasonality
29. Final Model (Code Snippet)
30. XGBoost
31. Mathematical Formulation
32. Diagram of Structure
33. Grid Search and Parameters chosen (Code Snippet)
34. MLP
35. Mathematical Formulation
36. Diagram of Structure
37. Grid Search and Parameters chosen (Code Snippet)
38. CNN
39. Mathematical Formulation
40. Diagram of Structure
41. PCA data into “images”
42. Grid Search and Parameters chosen (Code Snippet)
43. RNN/LSTM
44. Mathematical Formulation of RNN
45. Diagram of Structure
46. Additional Mathematical Structure of LSTM and why
47. Diagram of Structure
48. Data Preparation
49. Augmented Dickey-Fuller Test for Stationarity of PCA data
50. Determining the number of lags
51. Grid Search and Parameters chosen (Code Snippet)
52. Deep Q-Learning
53. Still learning about this one. Will fill in later
54. Results, Out-of-Sample, and Backtesting Comparison
55. Confusion Matrix on novel data
56. Backtesting and investment modeling (shock event of the Chinese real estate company doing poorly and the market bouncing back)
57. Discussion
58. Which methods performed the best
59. Brief outline of an algorithm using this model (Code Snippet)
60. Moving Forward
61. Alternatives for labeling
62. Alternatives for technical indicator selection
63. Hyperparameter tuning
64. Sentiment Analysis
65. Conclusion
66. Restate the primary goal
67. Reiterate the conclusions
68. Why is this important?
69. Summarize moving forward
70. Software/Packages
71. References/Acknowledgements
72. Code Snippets
73. Github/Single Asset Notebooks

Things to remember:

* Save seeds
* Save computational/run times