Google Interview Prep(Updated)

1. Supervised Learning
   1. Basics
      1. What is Linear Regression, How and Why does it work? (Possible Derivations)

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* + 1. What is Regularization? Why is it needed? What types of regularizers do exist? Explain in more detail in the scope of Linear regression i.e. Ridge, Lasso
    2. L1 and L2 what does each do/add to the optimization?
    3. What is the difference between R squared and adjusted R squared and what other metrics for model performance do you know.
    4. What is the difference between Regression vs Classification?
    5. Is Logistic Reg Classification or Regression ? Why answer in detail?
    6. What is the Confusion Matrix, Precision and Recall
    7. Given data that Lin Reg doesn't handle well, i.e. model capacity how can the same model be tweaked to handle the data (I thought the question was about Kernels and answered it that way so it seemed fine….Possible Kernels and maybe derivations can apply)
  1. Classical Methods
     1. What are Decision trees? How does one form a decision tree (Probable derivations)? When are decision trees effective (The last part of the question was very vague)
     2. How to prune a decision tree (Explain in detail)(Maybe they wanted more optimization objective i.e. SL notes should help)
     3. A question about KNN I don't remember well (talked about what KNN does, how one can find the best K, optimality of 1NN that they loved)
     4. Is Knn invariant towards rotations in data (Asked differently but it was basically the same…..obviously yes it is invariant ). What data points can one remove (I assume from training) such that the decision boundary/decisions for all the other points (I assume test points were meant) do not change?
     5. Describe the optimization Task for SVM. Difference between Soft and Hard Margin SVM. (How is a Lagrangian formed, what optimization can be used to solve it etc etc.) Can SVM handle Non-linearly separable or badly separable cases ? If so how ?
     6. Explain What Begging and Boosting Are? What are the core ideas behind each? Why do they seem like good ideas? (More questions here but i don't remember exactly)
     7. Something about ensambling.
  2. Statisticish questions
     1. What is bias Variance Tradeoff (speak in detail, probable derivation)(MSE decomposition helps)
     2. When a model overfits/underfits does it have high variance or bias?
     3. Whats No Free Lunch Theorem ? (I dont remember if google asked me this)
     4. Cross Validation On-time Series? (I dont remember the exact question)
  3. Unsupervised Learning
     1. Dimensionality reduction (PCA….they didnt ask But i told about PPCA #flexing)
     2. How does K-means work ? What is EM ? (Bishops Explanation suffuces here)
     3. What is a mixture of Gaussians ? How does EM work for it ? How is it different from K-means ?
     4. What is T-sne and why is it used? What is the advantage of t-sne over others?
  4. NN’s
     1. Feed Forward Explain? Backpropogation? (I also talked about AutoDiff)
     2. CNN explain? What's the good part of CNN over feedForward ? What if the Kernel Size is too big (It can sometimes be learned)
     3. RNN’s ? Whats Recurrence (maybe derivations)? LSTM’s, advantages over regular RNN’s
     4. (Some strange Question that i remember like) Is it possible to do transfer learning with LSTMS? (Or smth like that)
     5. The idea behind Word2Vec i.e Skipgram vs CBOW architectures.

This is as much as I remember and how I prepared yet :)