OneNote for Windows 10

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Shapes Ink to Shape Ink to Text

DSMP 2022-23

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What is Regularization
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What is Regularization

19 May 2023 07:28

$$\text{loss} = \underbrace{(\text{bias})^2}_{\downarrow} + \uparrow \underbrace{\text{var}}_{} + \underbrace{\text{noise}}_{}$$

complex

overfitting → regularization

regular

linear model — Decision tree — Neural network

$$(L) = \sum_{i=1}^{n} (y_i - \hat{y}_i)^2 \quad \text{min}$$

$$\rightarrow \underbrace{[(L) + \text{extra term}]}_{} \text{ min}$$

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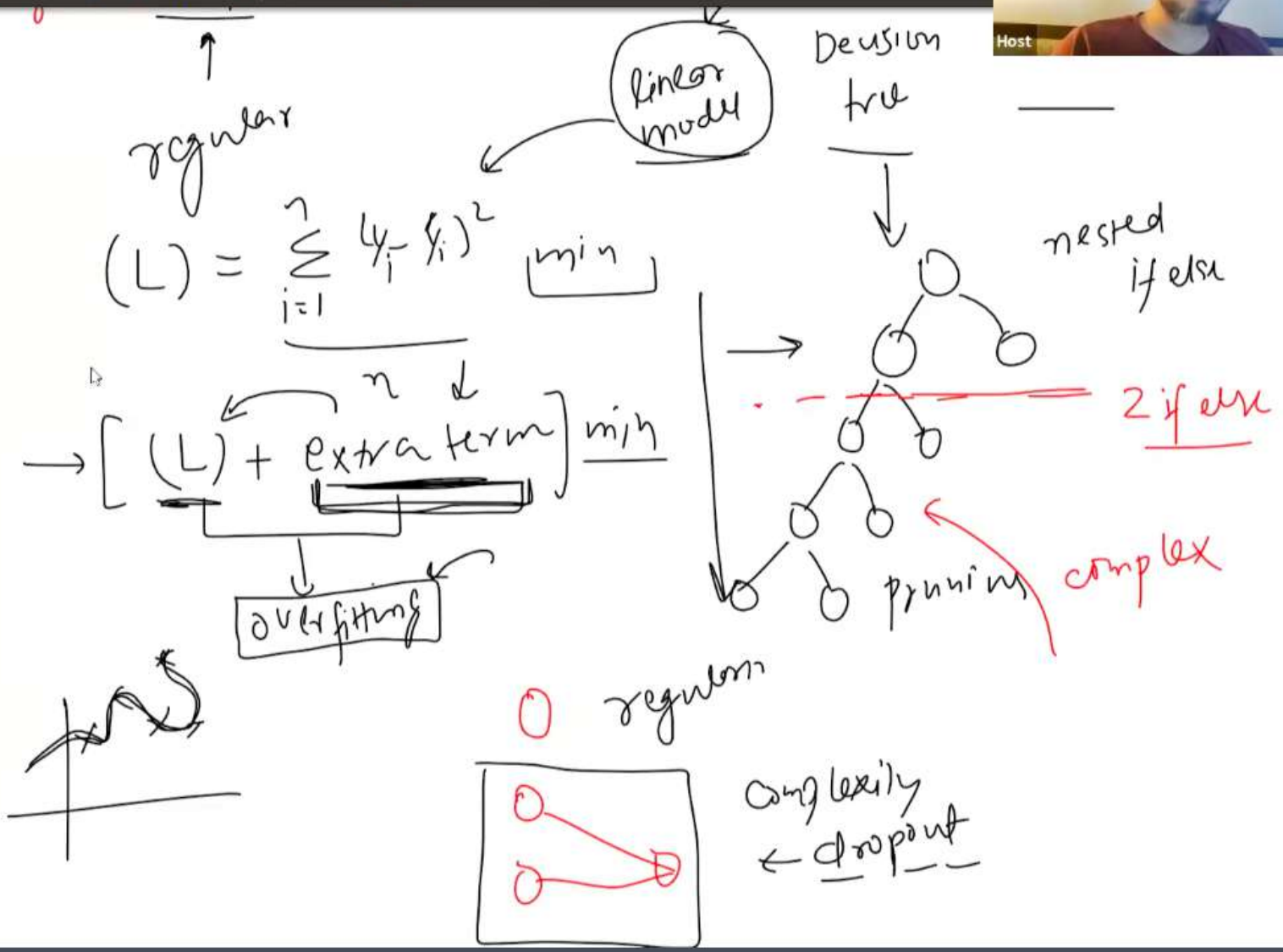
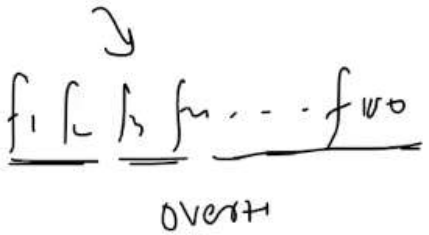


Host

When to use Regularization?

19 May 2023 07:31

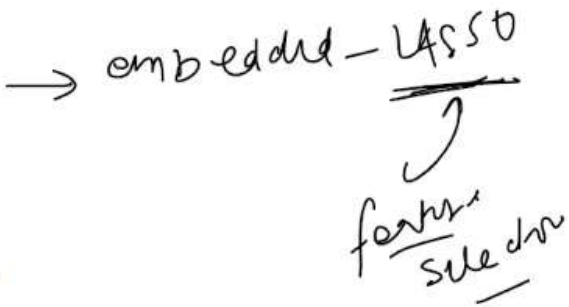


1. Preventing Overfitting: Regularization is most commonly used as a tool to prevent overfitting. If your model performs well on the training data but poorly on the validation or test data, it might be overfitting, and regularization could help.

2. High Dimensionality: Regularization is particularly useful when you have a high number of features compared to the number of data points. In such scenarios, models tend to overfit easily, and regularization can help by effectively reducing the complexity of the model.

3. Multicollinearity: When features are highly correlated (multicollinearity), it can destabilize your model and make the model's estimates sensitive to minor changes in the model. L2 regularization (Ridge regression) can help in such cases by distributing the coefficient estimates among correlated features.

4. Feature Selection: If you have a lot of features and you believe many of them might be irrelevant, L1 regularization (Lasso) can help. It tends to produce sparse solutions, driving the coefficients of irrelevant features to zero, thus performing feature selection.



5. Interpretability: If model interpretability is important and you want a simpler model, regularization can help achieve this by constraining the model's complexity.

6. Model Performance: Even if you're not particularly worried about overfitting, regularization might still improve your model's out-of-sample prediction performance.