# ML Lab 07

## How does increasing C affect the model's accuracy?

* Increasing C in an SVM model reduces the margin but makes the model focus more on correctly classifying training samples. This usually leads to higher accuracy on training data but can cause overfitting, reducing generalization to new data.
* The notebook results show that lower C values (e.g., C=0.01) resulted in slightly lower accuracy (70%) compared to higher values (e.g., C=1.0). However, beyond a certain point, increasing C may not significantly improve test accuracy (71%) and may even degrade performance due to overfitting.

## Does the RBF kernel outperform the linear kernel? Why or why not?

* The RBF kernel generally outperforms the linear kernel when the data is not linearly separable, as it can map data into a higher-dimensional space.
* If the features in the dataset exhibit nonlinear relationships, the RBF kernel performs better than the linear kernel.
* The notebook results indicate that for C=1.0, the linear kernel achieved an accuracy of around 70%, whereas the RBF kernel (with an optimized gamma) achieved an accuracy of around 73%. If gamma is well-tuned, the RBF kernel often provides higher accuracy.

## What happens when gamma is too small or too large?

* Gamma is too small - The model behaves like a linear classifier because it considers far-away points when computing decision boundaries, leading to underfitting (low complexity).
* Gamma is too large - The model focuses only on very close data points, making it highly sensitive to noise, leading to overfitting (high complexity).
* The notebook shows that very small gamma values resulted in poor decision boundaries (like a linear classifier), while very high gamma values captured noise, reducing generalization.