Class core values

1. Be **respect**ful to yourself and others
2. Be **confident** and believe in yourself
3. Always do your **best**
4. Be **cooperative**
5. Be **creative**
6. Have **fun**
7. Be **patient** with yourself while you learn
8. Don’t be shy to **ask “stupid” questions**
9. Be **inclusive** and **accepting**

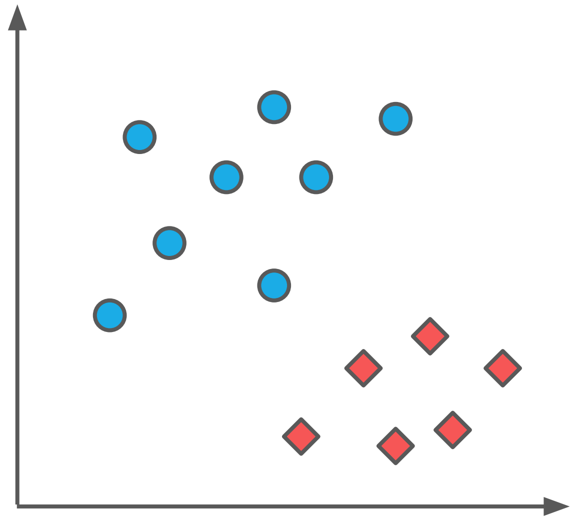
Week 2, Lecture 2

Simple methods can take you a long way

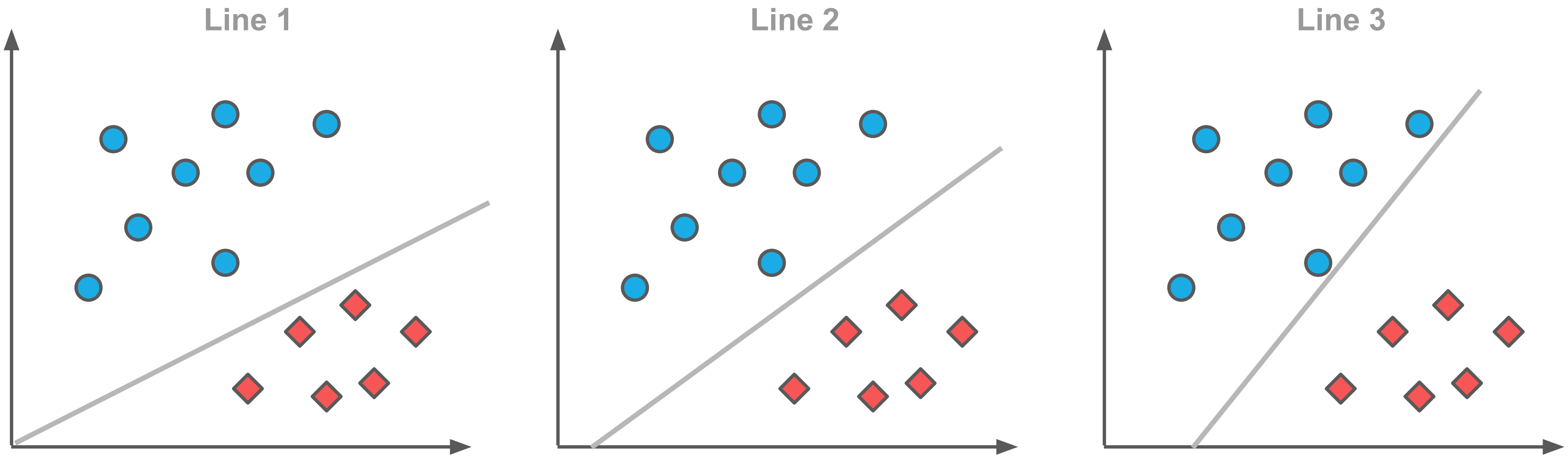
Learning Objectives

1. Describe the basic concept of a support vector machines
2. Describe the basic concept of a kernel
3. Apply computational coding to create and train a SVM
4. Evaluate the performance of models
5. Critically evaluate literature using RF

Selecting the best line



Selecting the best line



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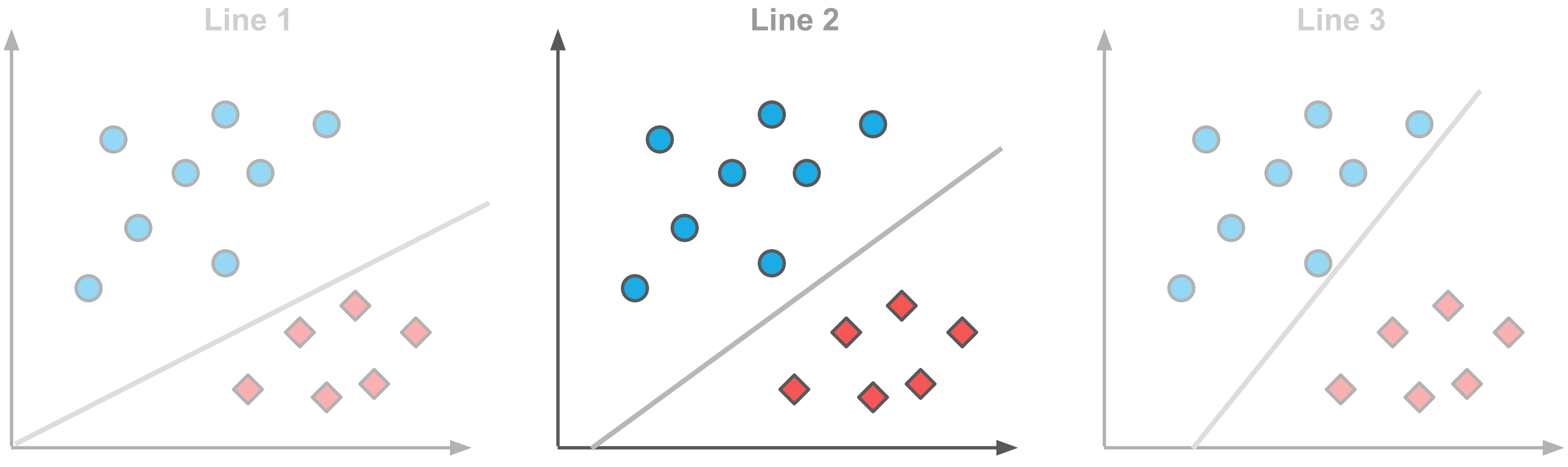
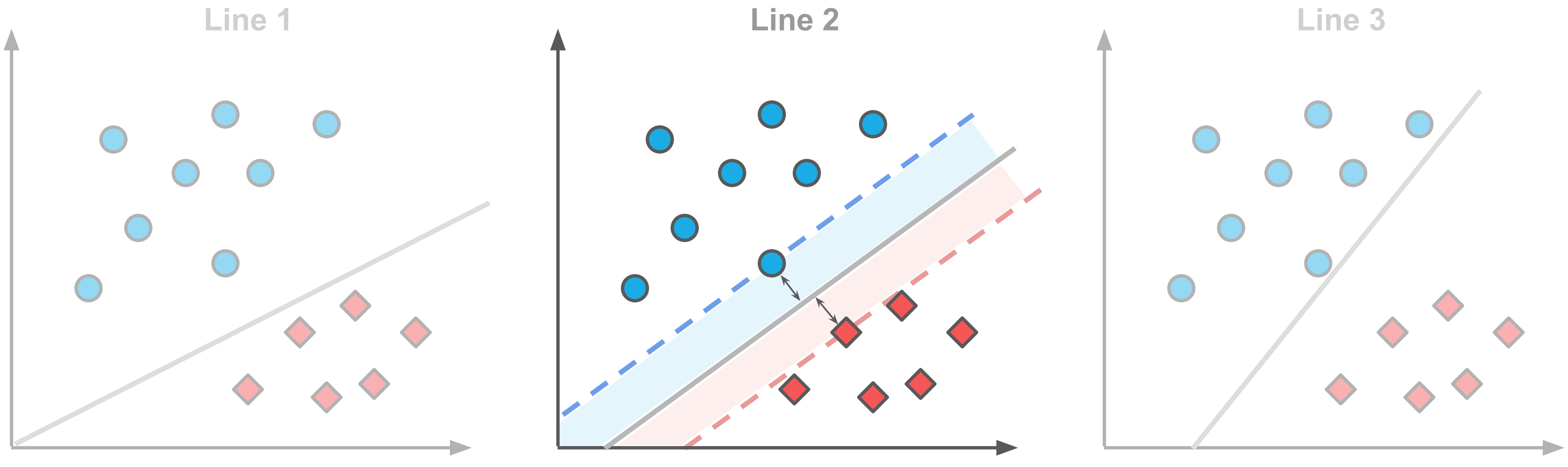
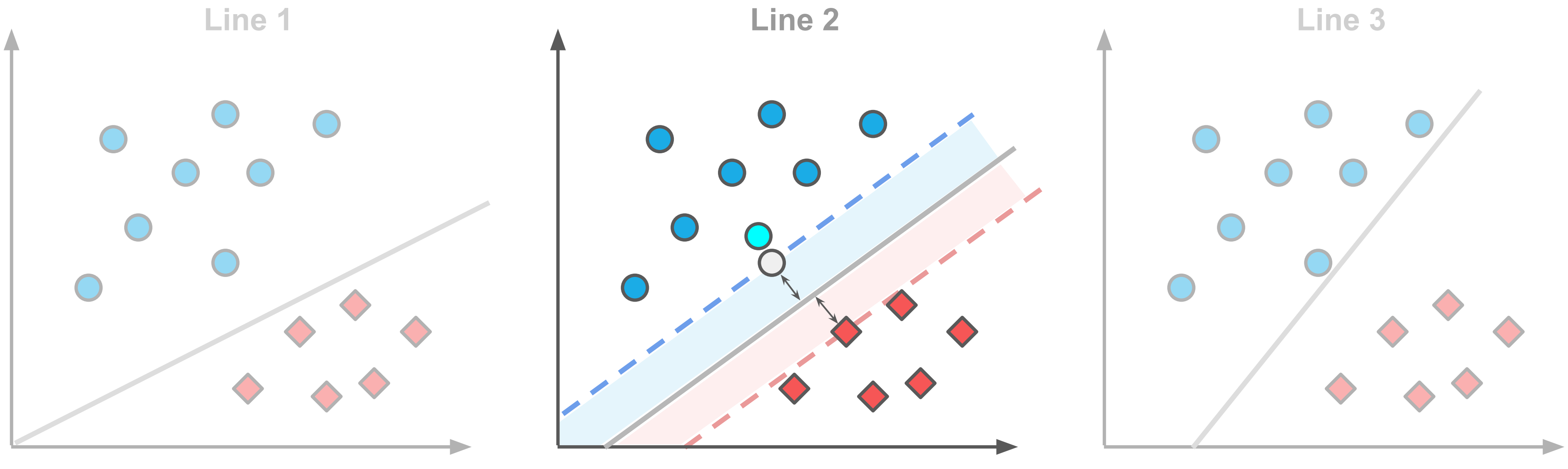


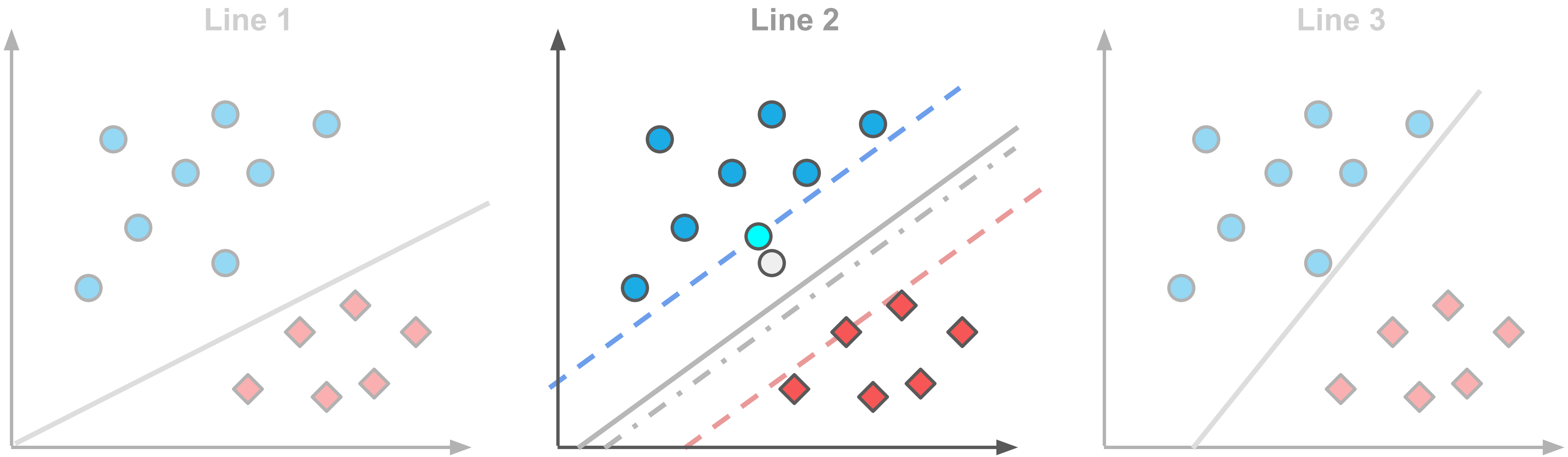
The best separating line is the one that has the largest **margins** from data



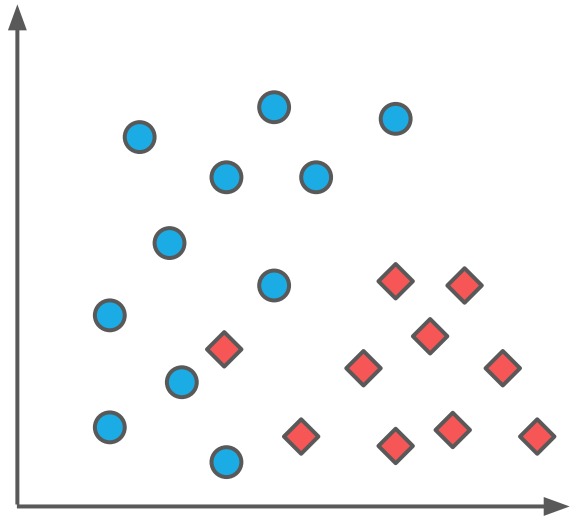
Closest points to the selected lines are called **support vectors**



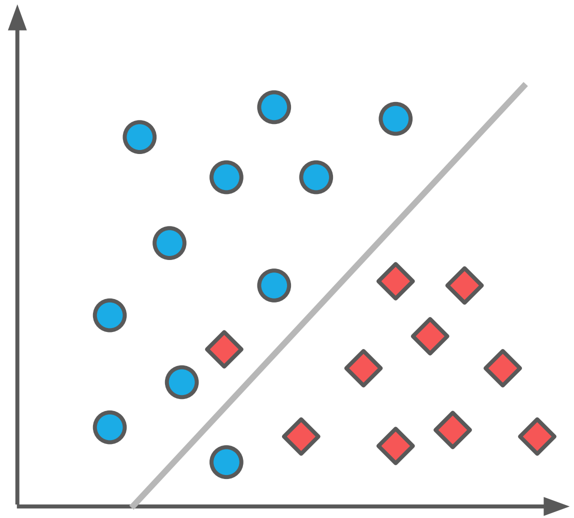
Changing the position of support vectors will change the selection of the best lie



When there is no line that perfectly separates the data …



When there is no line that perfectly separates the data, we choose one that *almost* separates them



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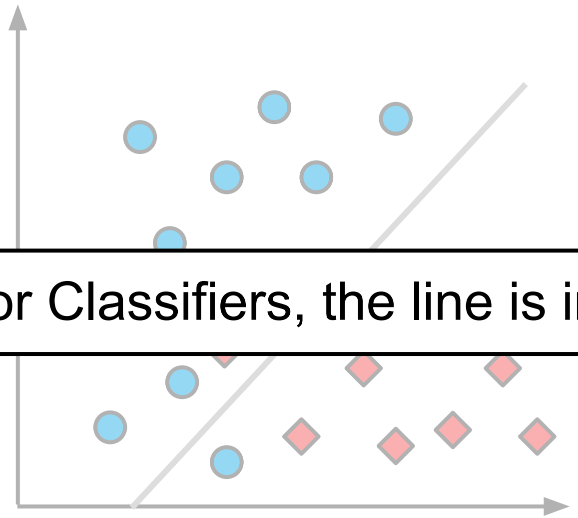
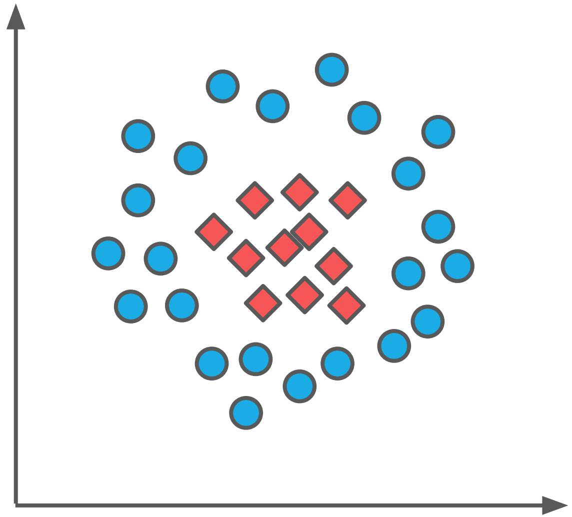
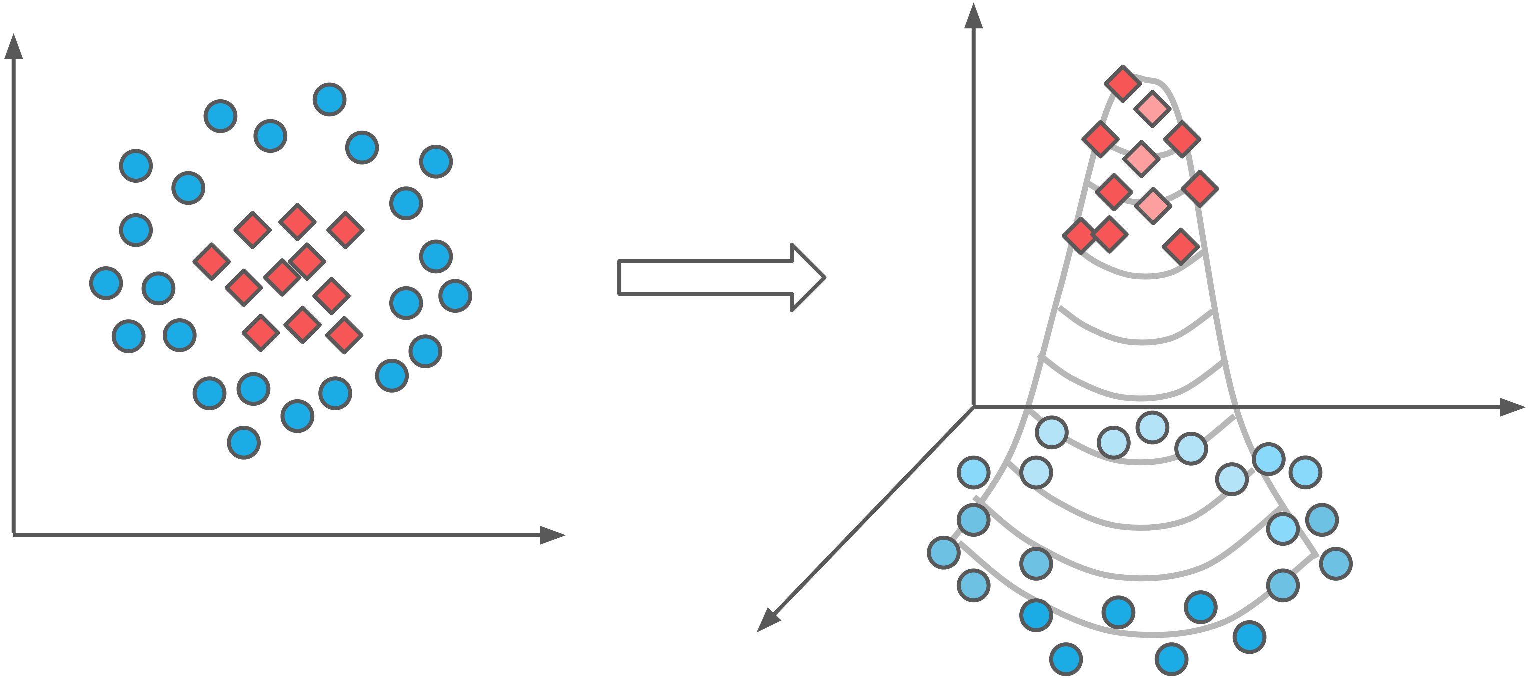


In Support Vector Classifiers, the line is in fact a *hyperplane*

What if there is no linear correlation?



Transforming data into another space can help in finding the desired hyperplane



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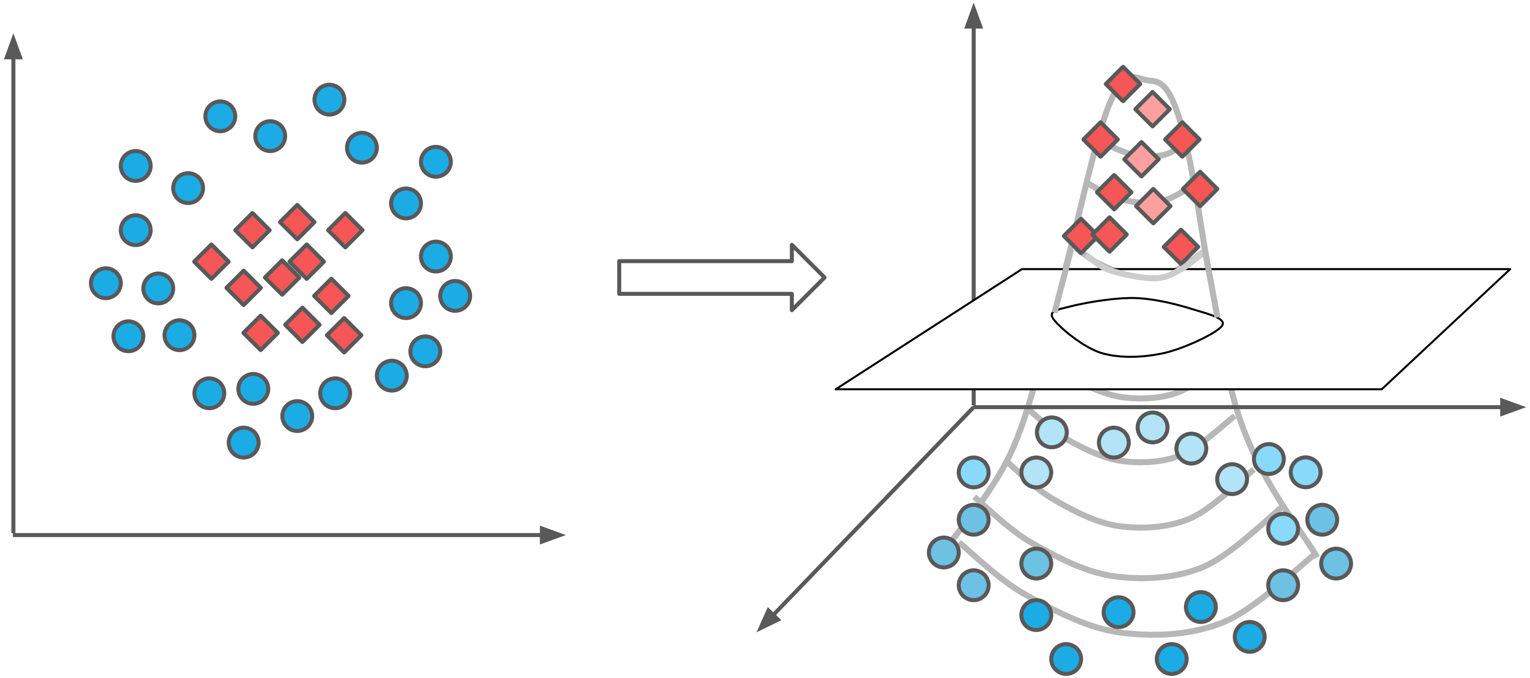

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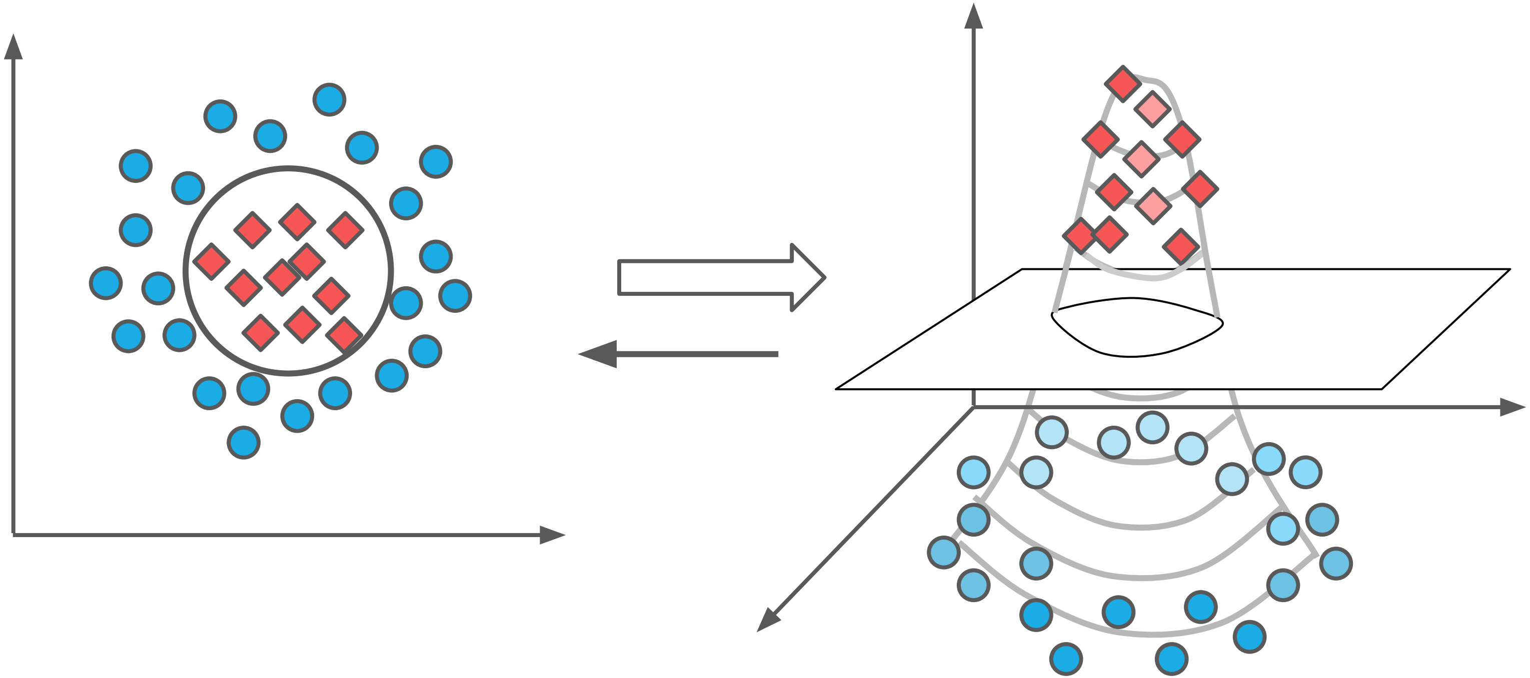
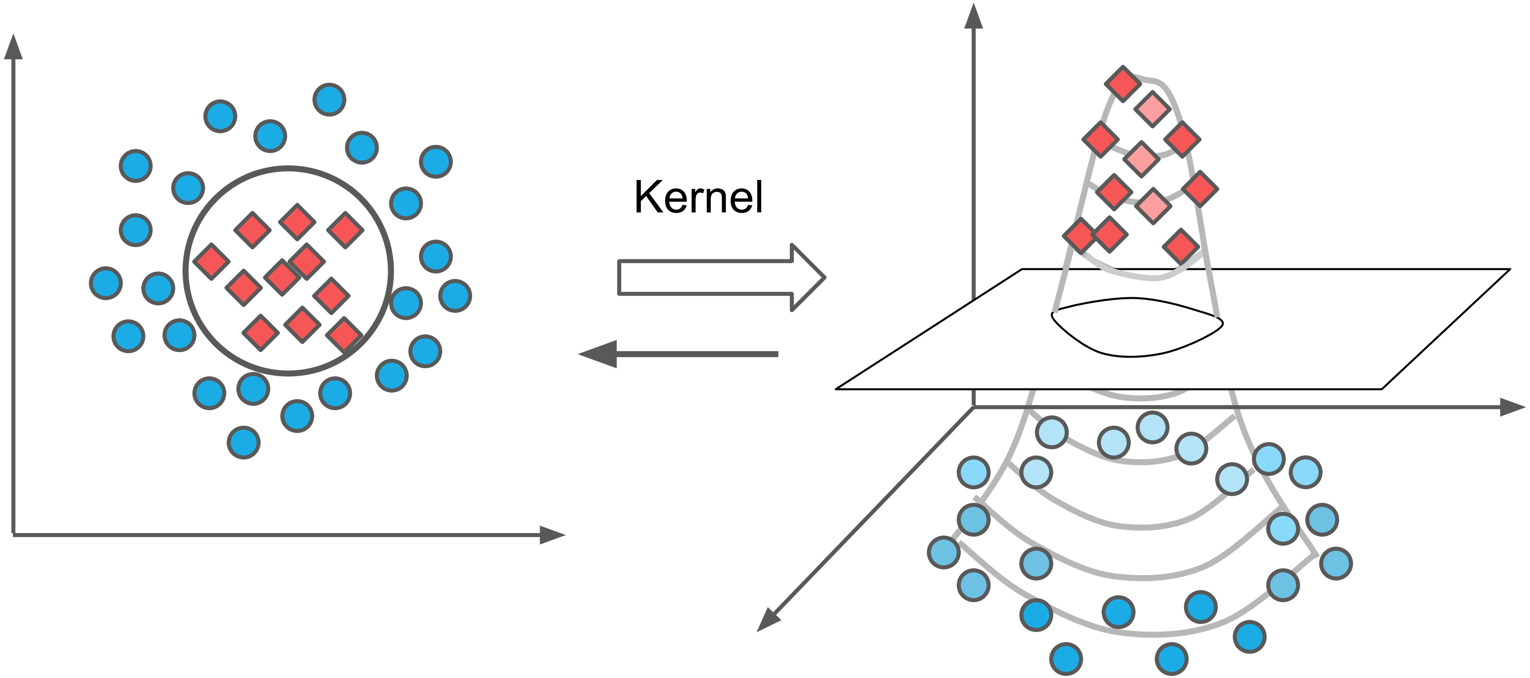
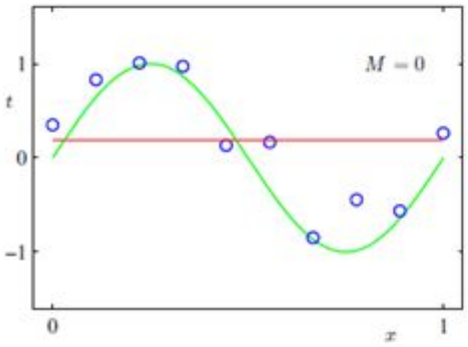


The transformers are called **kernels**



Regularization in a nutshell is a way to avoid overfitting



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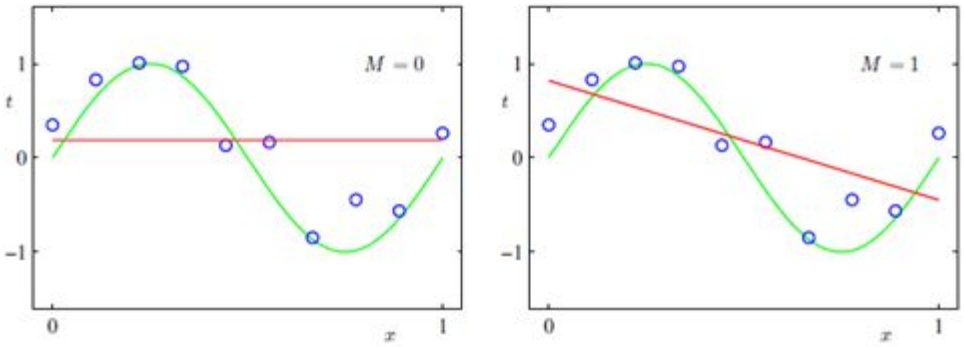

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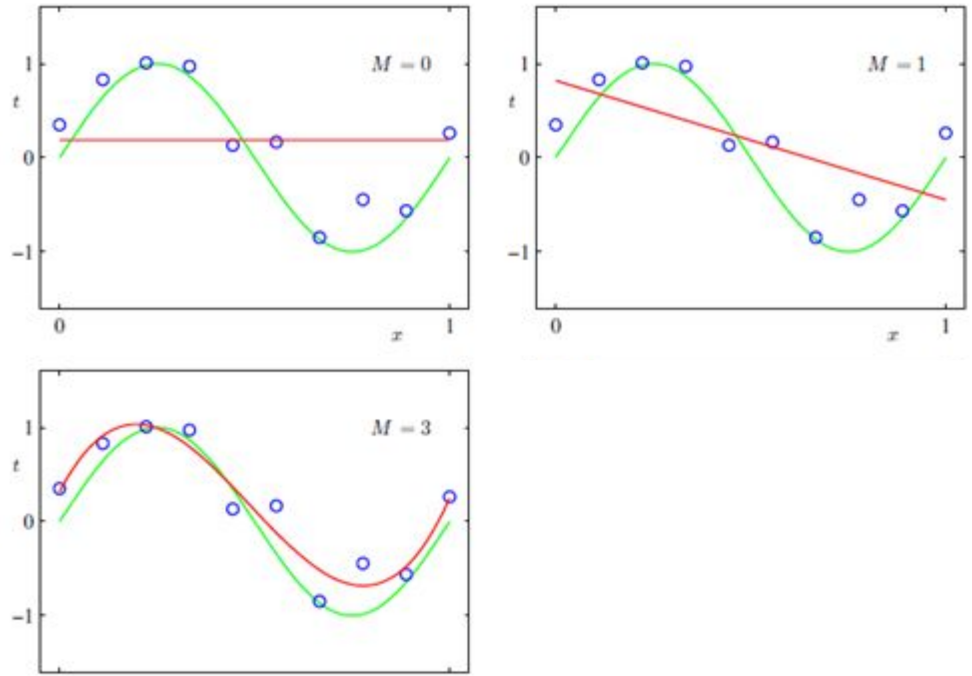


Image from [towards data science: Regularization]

Regularization in a nutshell is a way to avoid overfitting

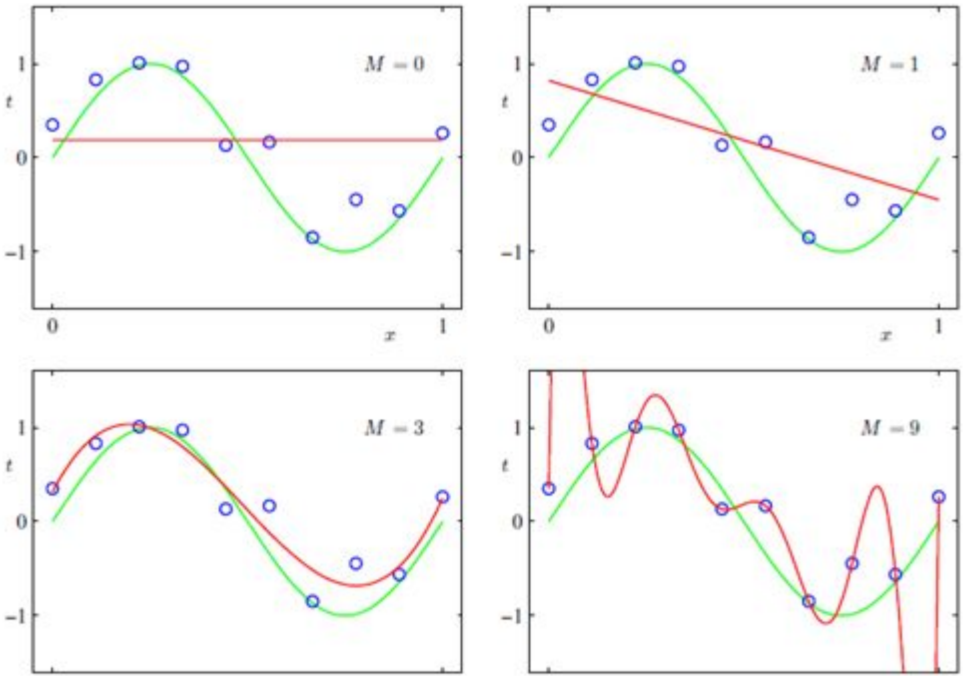
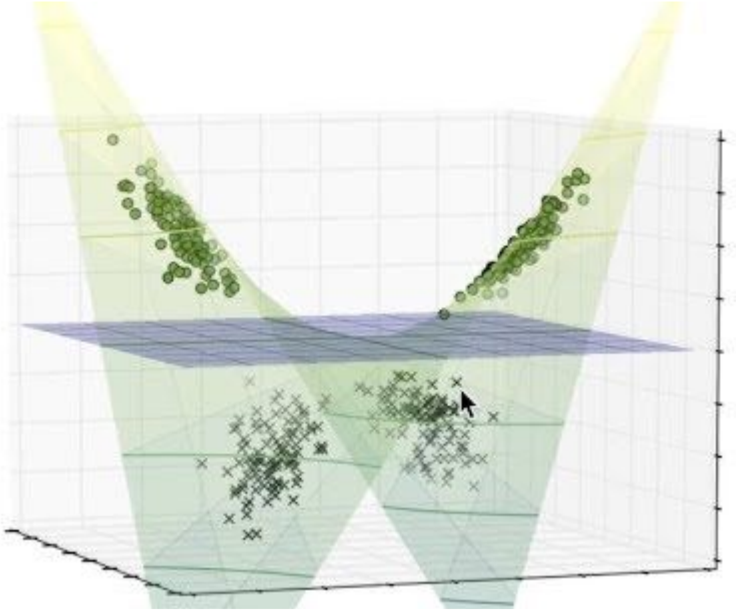


Image from towards data science: Regularization

In-class activity

Applying SVM



Notes on SVM

Pros:

1. Effective in high dimension
2. Works when dimensions (features) are bigger than samples
3. Memory efficient
4. Versatile

Notes on SVM

Pros:

1. Effective in high dimension
2. Works when dimensions (features) are bigger than samples
3. Memory efficient
4. Versatile

Cons:

1. Over-fitting can be a problem when # features >> # samples
2. Do not directly provide probability estimates
3. Not scalable if you have lots of data (> 10000)

Next lecture:

A gentle introduction to a “neuron”

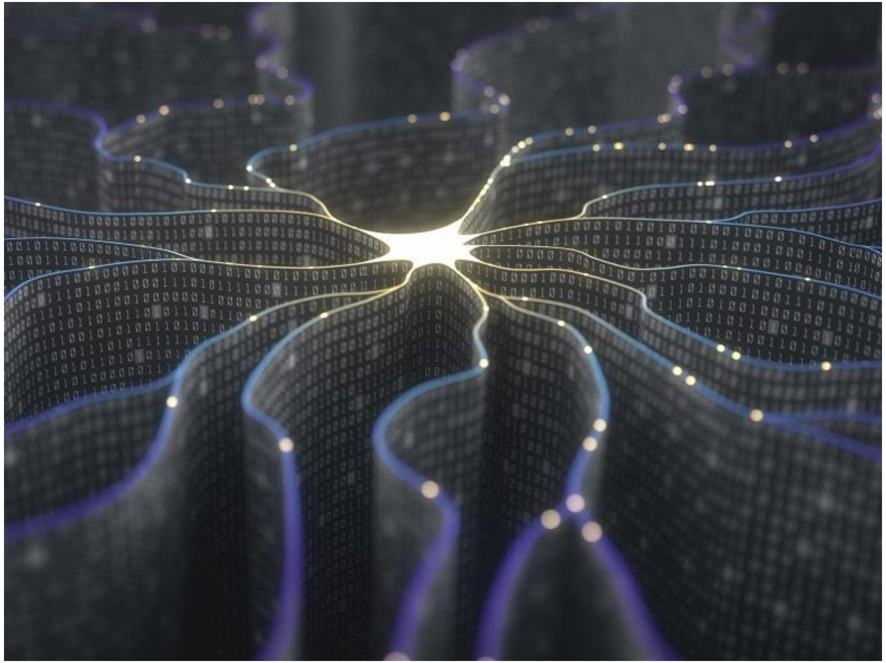


Image from Sci Tech Daily: Deep learning AI explained