

A close-up photograph of pink cherry blossoms on dark, thin branches. The background is a soft, out-of-focus white and light pink, suggesting a bright, sunny day. The word "STACKING" is written in a clean, white, sans-serif font in the center of the image. A thin white vertical line is positioned to the right of the text.

STACKING

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# STACKING



What is stacking?



Benefit of stacking



How stacking  
works



Stacking in  
bagging's  
perspective



Stacking with  
supervised  
learning



Stacking with  
reinforcement  
learning



Meta learning



Code

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# WHAT IS STACKING?





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STACKING IS AN ENSEMBLE LEARNING TECHNIQUE THAT COMBINES MULTIPLE MACHINE LEARNING MODELS TO IMPROVE PREDICTIVE PERFORMANCE. IT WORKS BY TRAINING A "META-MODEL" TO LEARN HOW TO BEST COMBINE THE PREDICTIONS FROM SEVERAL BASE MODELS.



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# BENEFIT OF STACKING

	Benefit of stacking
Supervised learning	<ul style="list-style-type: none"><li>- Improve predictive performance</li><li>- (Improve generalization)</li><li>- (Robustness to overfitting)</li><li>- <b>Adaptability</b></li></ul>
Reinforcement learning	<ul style="list-style-type: none"><li>- Improve policy performance</li><li>- <b>Adaptability</b></li></ul>



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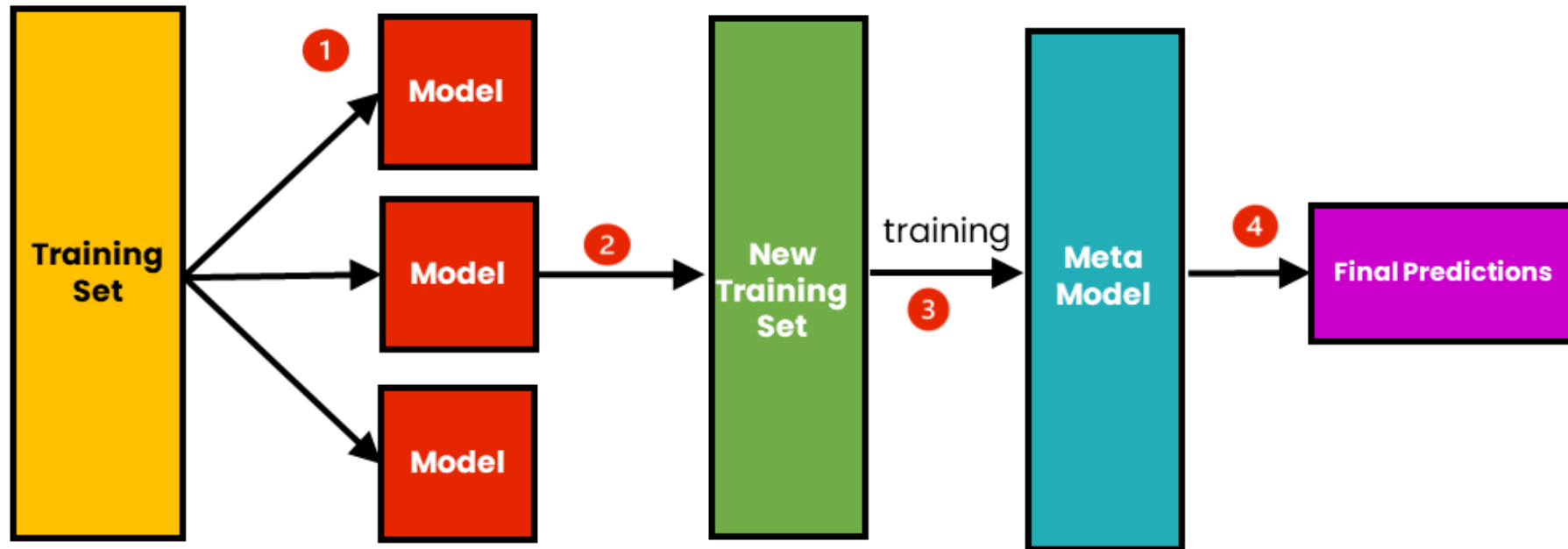
# HOW STACKING WORKS

- Bootstrapping
- Training multiple models
- Predictions
- Meta-learner
- Final prediction

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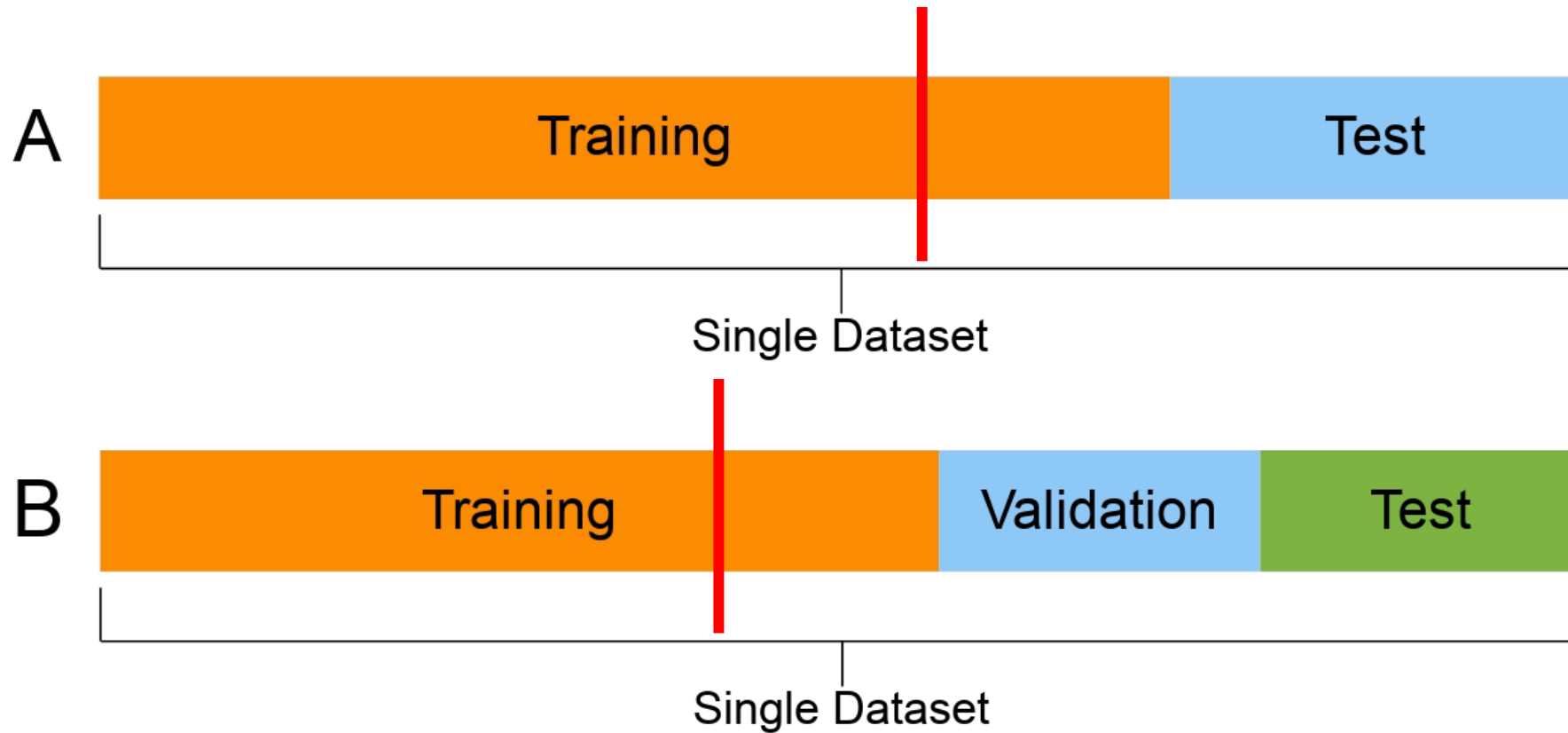
# HOW STACKING WORKS

## The Process of Stacking



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# HOW STACKING WORKS





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# HOW STACKING WORKS

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# STACKING IN BAGGING'S PERSPECTIVE

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# STACKING IN BAGGING'S PERSPECTIVE

- More ready to adopt to new concept (data distribution)
- Stacking mechanism in adaptation is like changing original data distribution of base model to new data distribution.



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# STACKING IN BAGGING'S PERSPECTIVE

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# STACKING WITH SUPERVISED LEARNING



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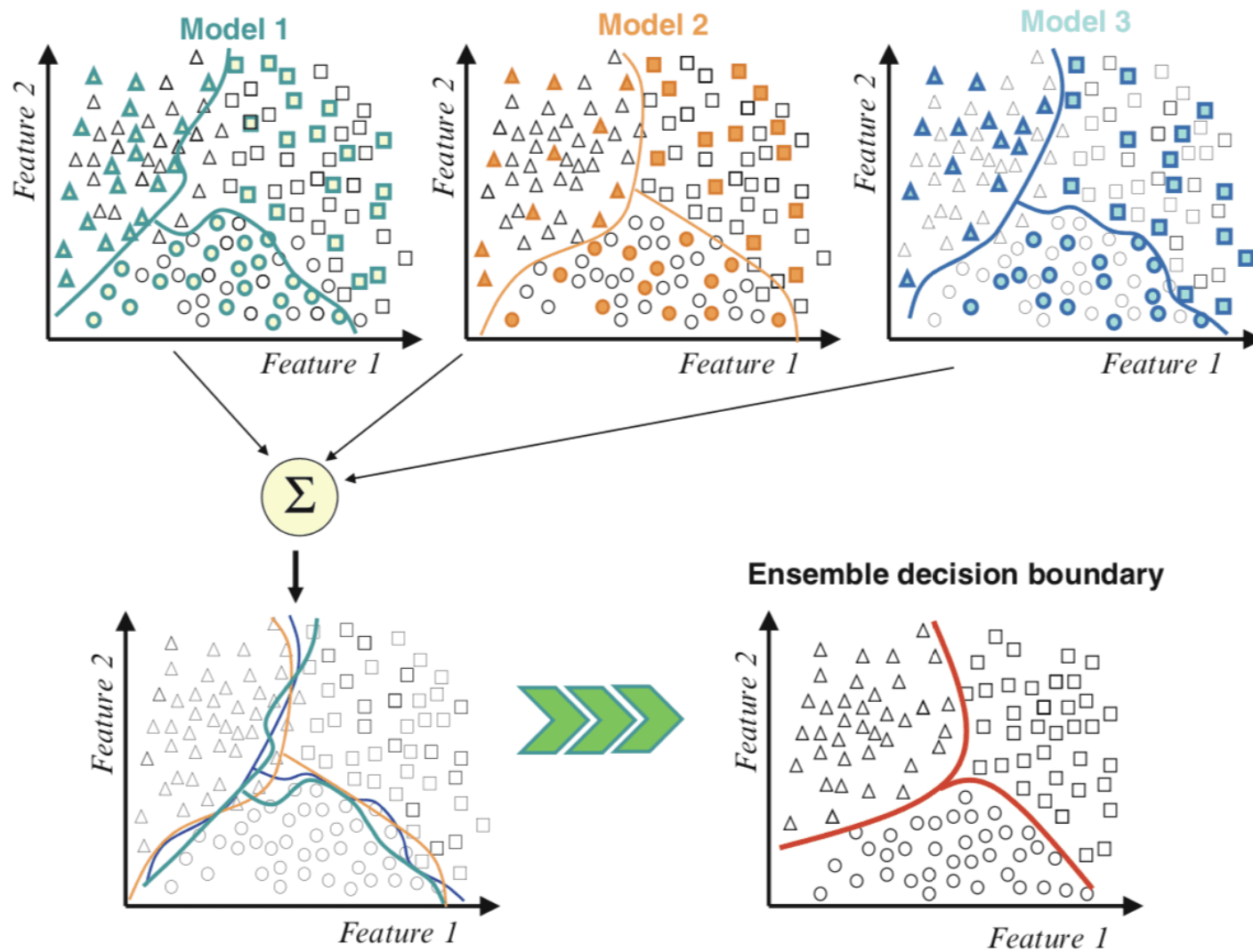
# STACKING WITH SUPERVISED LEARNING



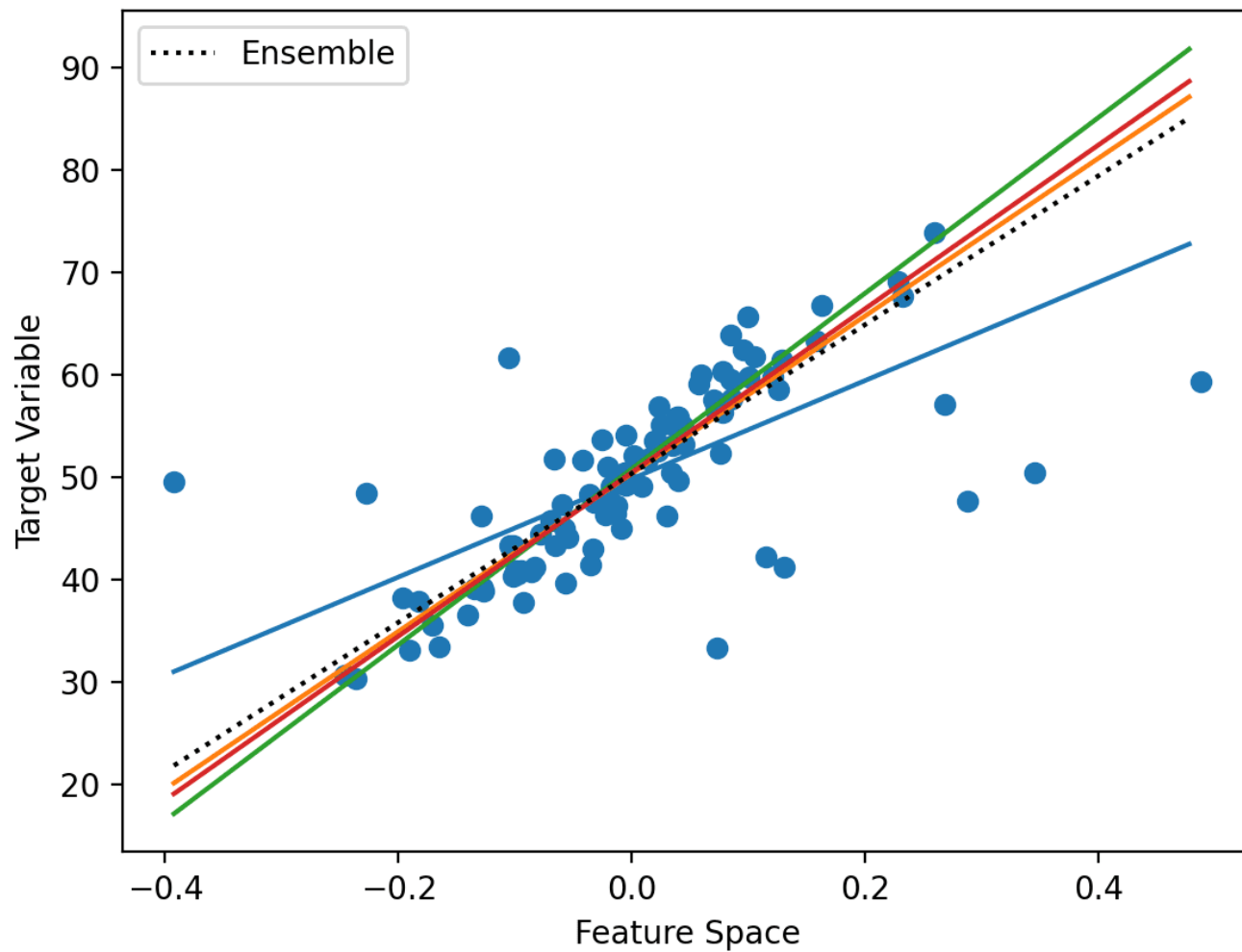
Classification



Regression



# STACKING WITH SL - CLASSIFICATION



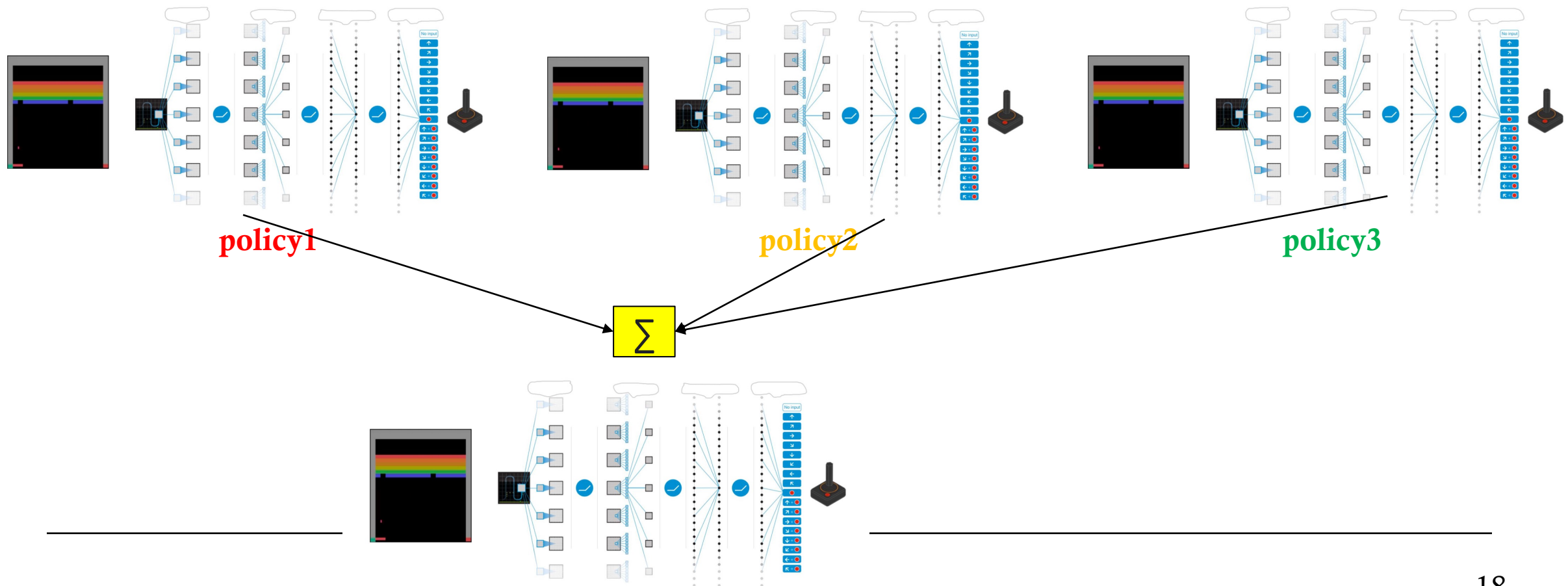
# STACKING WITH SL - REGRESSION

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A network diagram is constructed on a dark, textured wooden surface. It consists of approximately 12 brass-colored pins standing upright. These pins are interconnected by thin, translucent yellow-green threads, forming a complex web of connections. The threads radiate from a central point and connect to various other pins, some of which are further connected to each other, creating a multi-layered network structure. The background is a blurred view of the same wooden surface with other pins and threads, suggesting a larger, more extensive network.

# STACKING WITH REINFORCEMENT LEARNING

# STACKING WITH REINFORCEMENT LEARNING





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# CODE

- Stacking – SL.ipynb
- Stacking – RL.ipynb

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# QUESTION & ANSWER

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# REFERENCE

- <https://www.analyticsvidhya.com/blog/2023/01/ensemble-learning-methods-bagging-boosting-and-stacking/>
- <https://machinelearningmastery.com/meta-learning-in-machine-learning/>
- [https://commons.wikimedia.org/wiki/File:ML\\_dataset\\_training\\_validation\\_test\\_sets.png](https://commons.wikimedia.org/wiki/File:ML_dataset_training_validation_test_sets.png)