Background Check: A general technique to build more reliable and versatile classifiers

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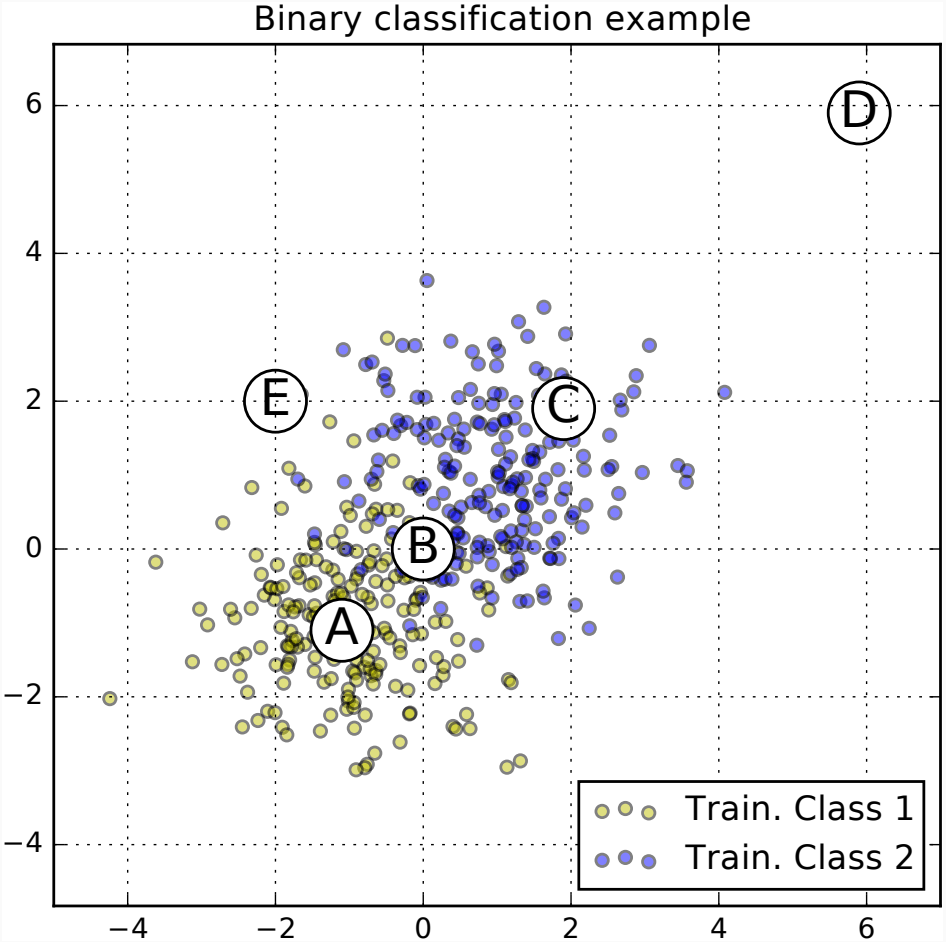
Representing uncertainty

1. Cautious classification
2. Outlier detection
3. Classification with confidence

Representing uncertainty

1. Cautious classification
2. Outlier detection
3. Classification with confidence

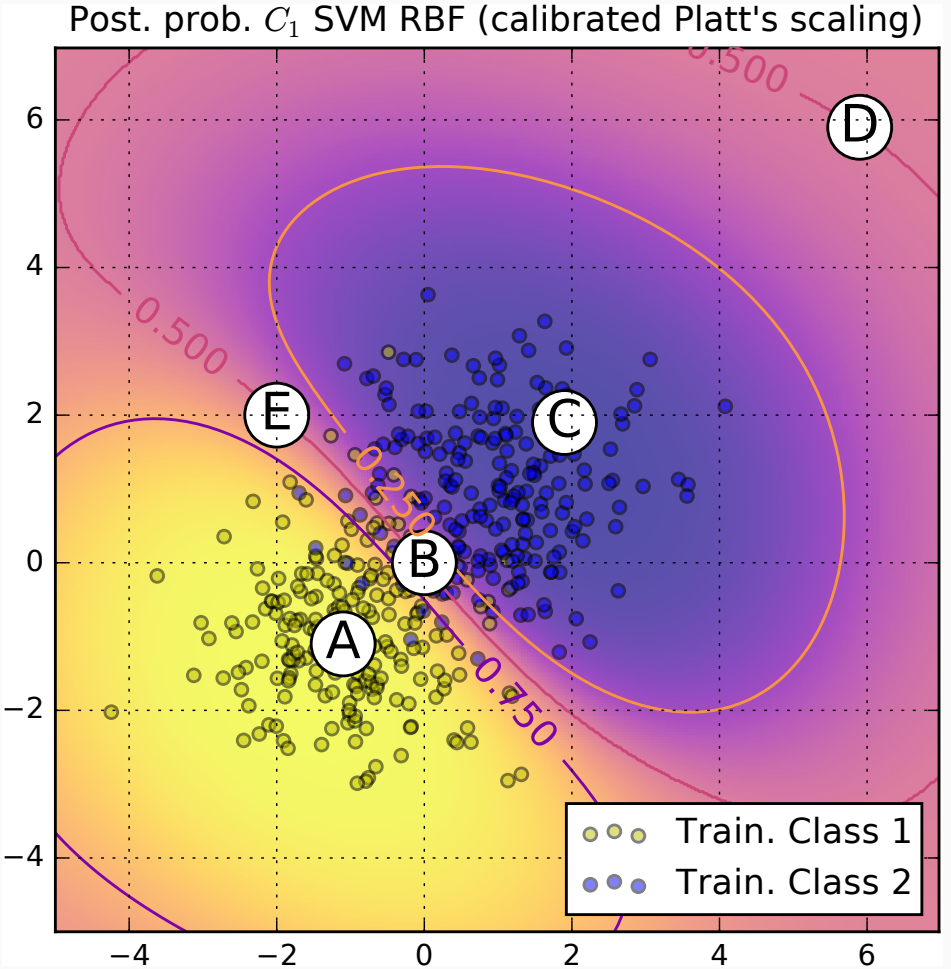
	$p(C_1\|x)$	$p(C_2\|x)$
A		
B		
C		
D		
E		



Representing uncertainty

1. Cautious classification
2. Outlier detection
3. Classification with confidence

	$p(C_1\|x)$	$p(C_2\|x)$
A	1	.0
B	*.5*	*.5*
C	.0	1
D	*.5*	*.5*
E	*.5*	*.5*



Representing uncertainty

1. Cautious classification
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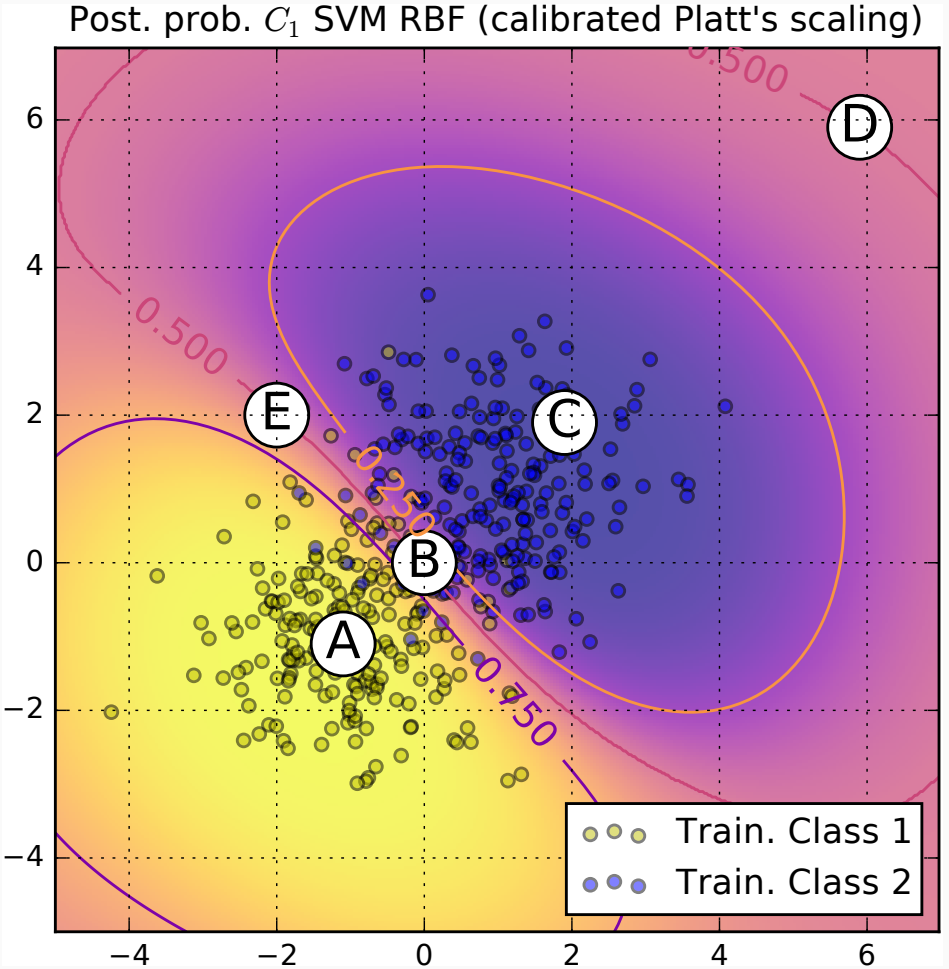
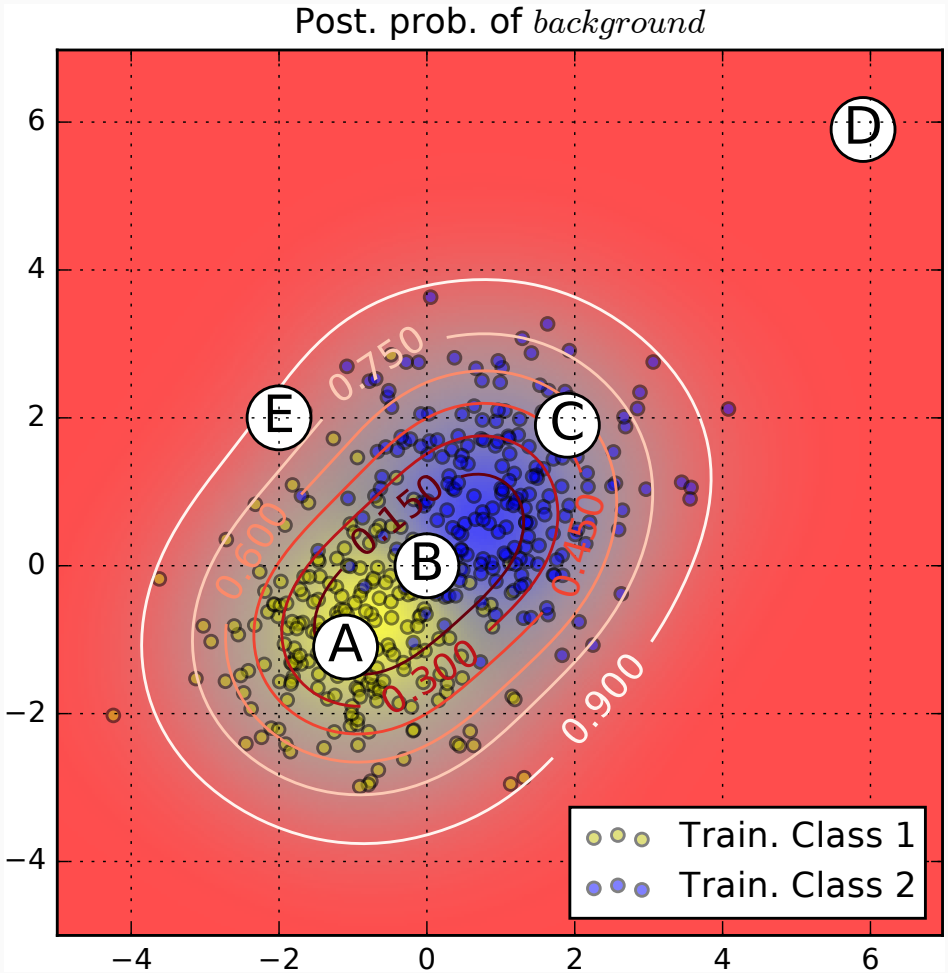
	$p(C_1\|x)$	$p(C_2\|x)$	$p(b\|x)$
A	1	.0	
B	*.5*	*.5*	
C	.0	1	
D	*.5*	*.5*	
E	*.5*	*.5*	



Representing uncertainty

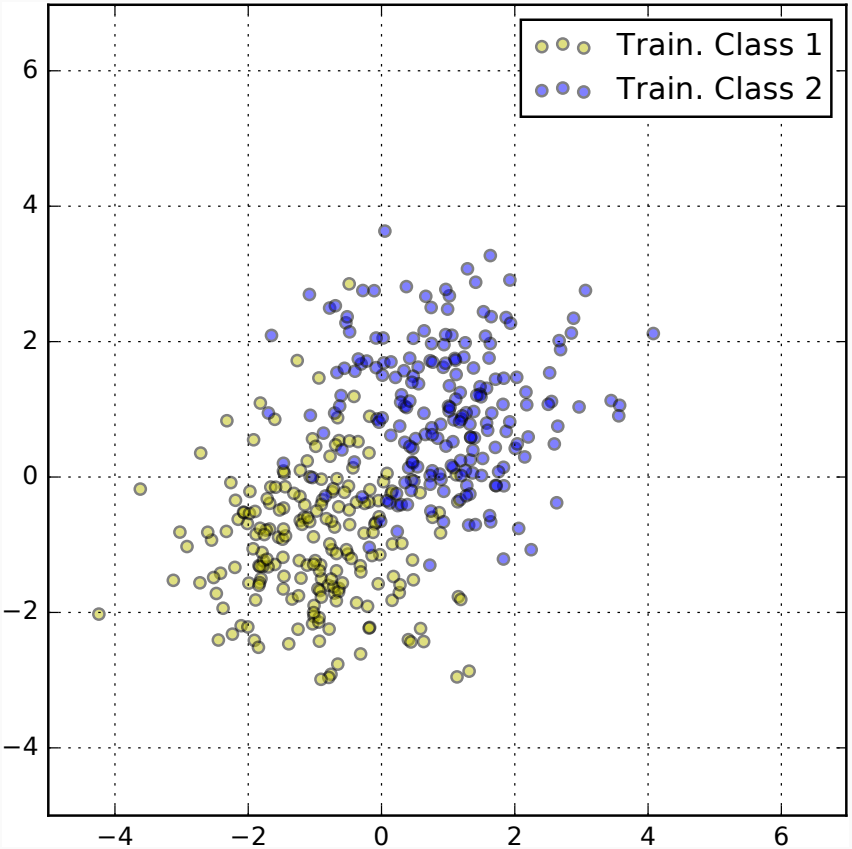
1. Cautious classification
2. Outlier detection
3. Classification with confidence

	$p(C_1\|x)$	$p(C_2\|x)$	$p(b\|x)$
A	$1 \rightarrow .9$	$.0 \rightarrow .0$	.1
B	$.5 \rightarrow .5$	$.5 \rightarrow .5$	.0
C	$.0 \rightarrow .0$	$1 \rightarrow .5$	.5
D	$.5 \rightarrow .0$	$.5 \rightarrow .0$	1
E	$.5 \rightarrow .1$	$.5 \rightarrow .1$	.8



Performing Background Check

- *Discriminative* approach
  - Pre-trained classifier
  - Generate background
  - Train binary classifier



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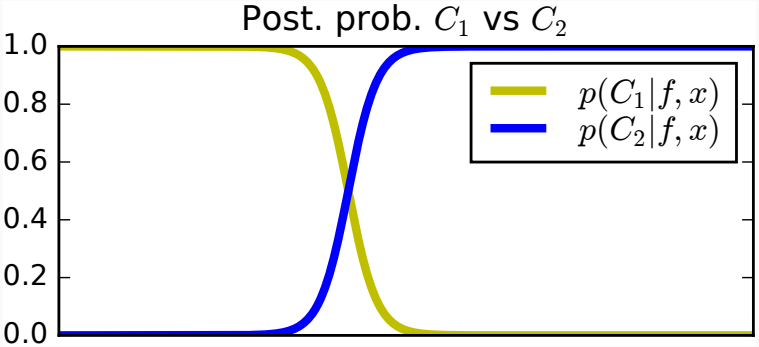

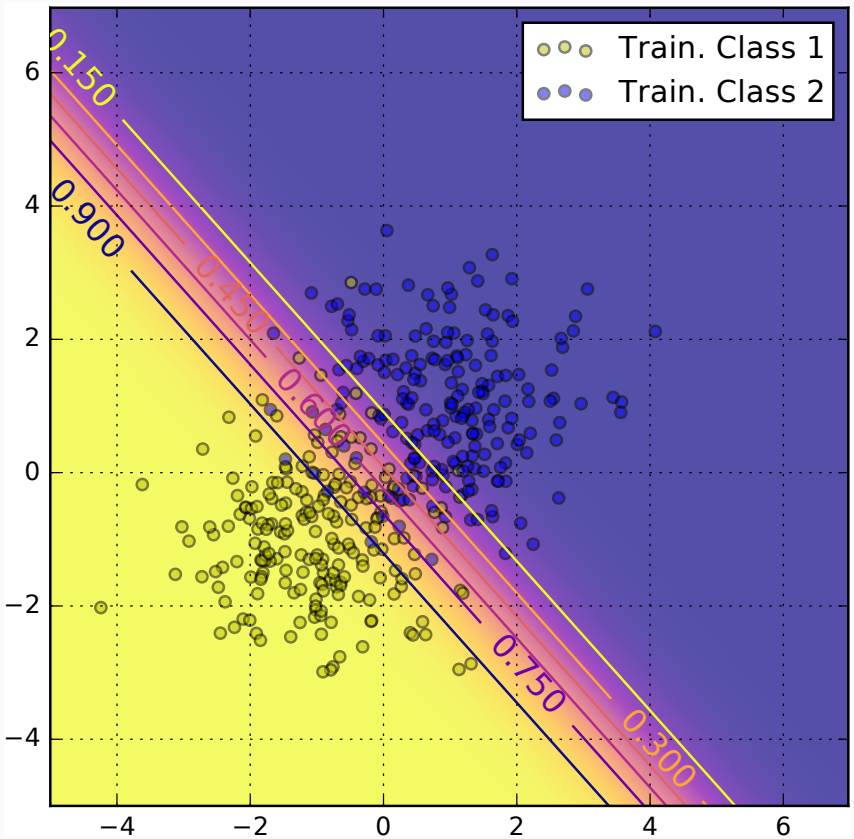

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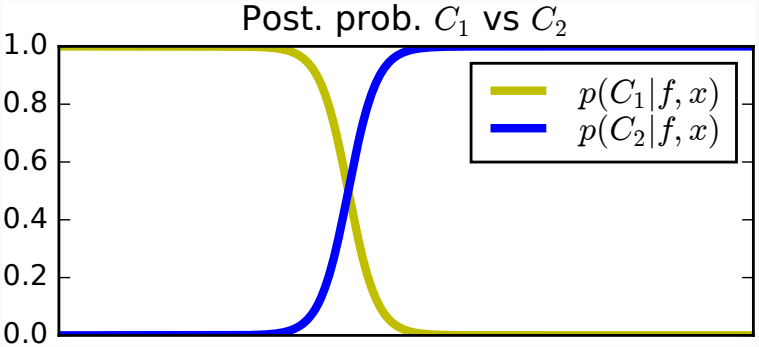

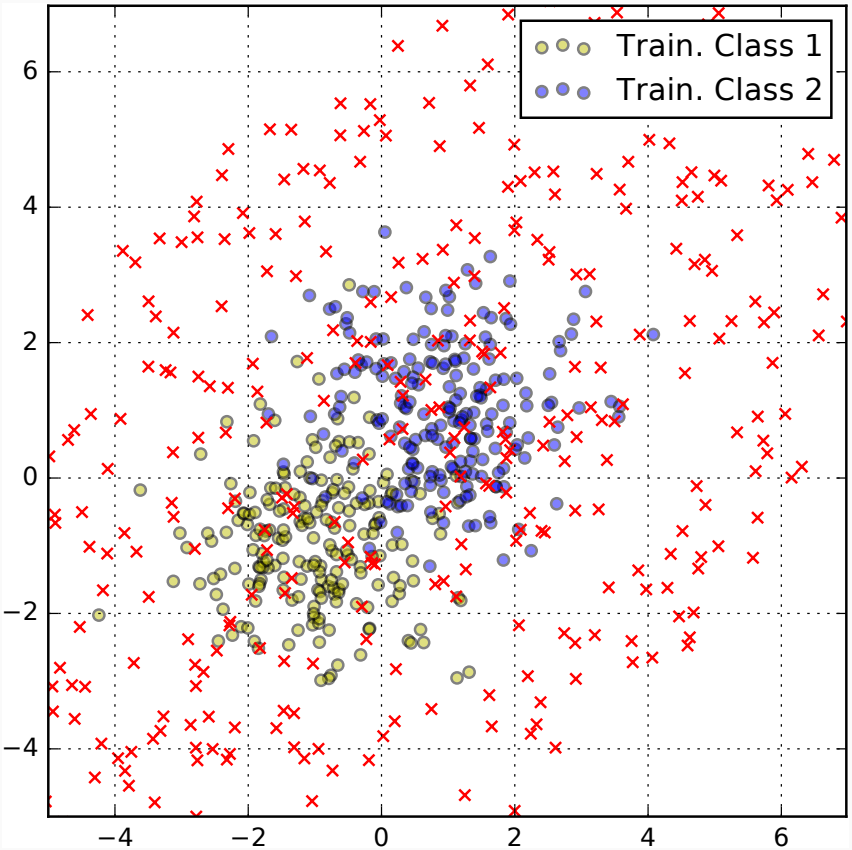

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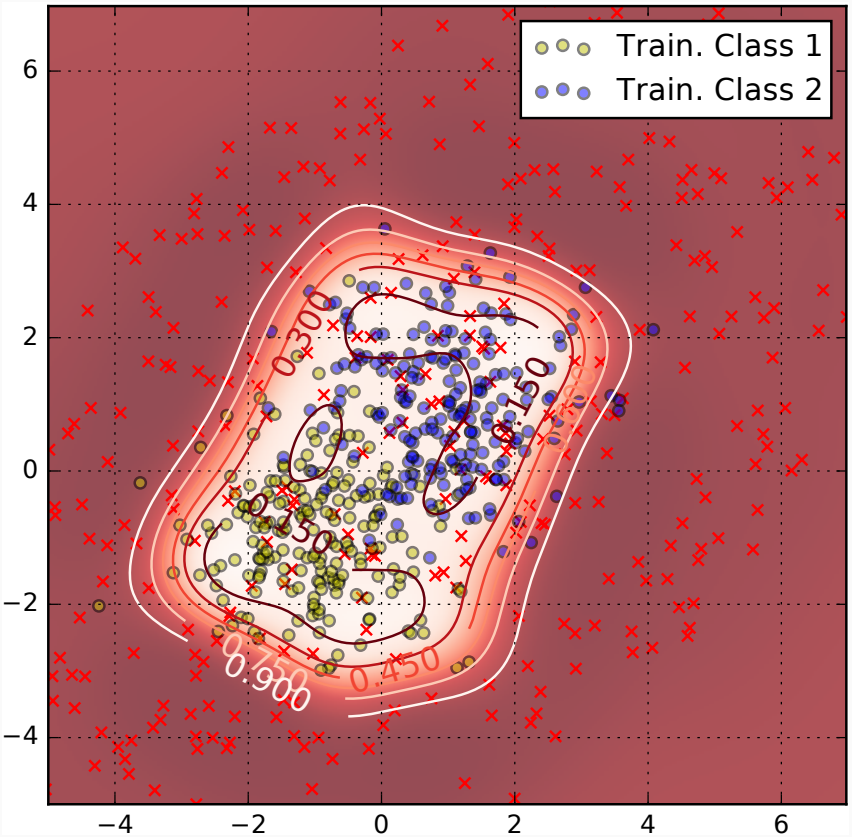

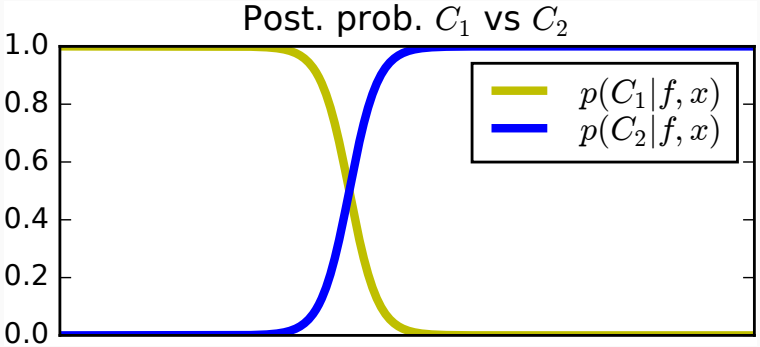

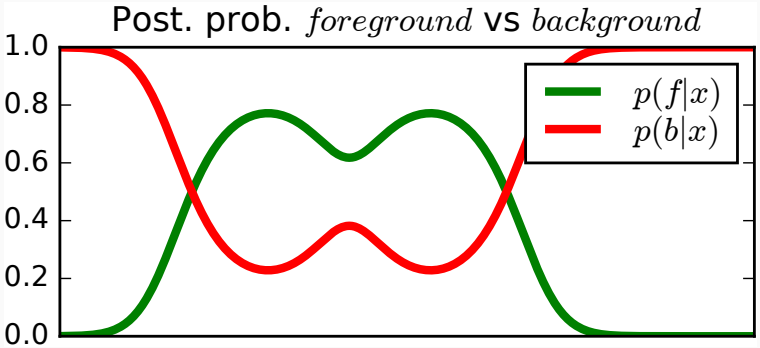

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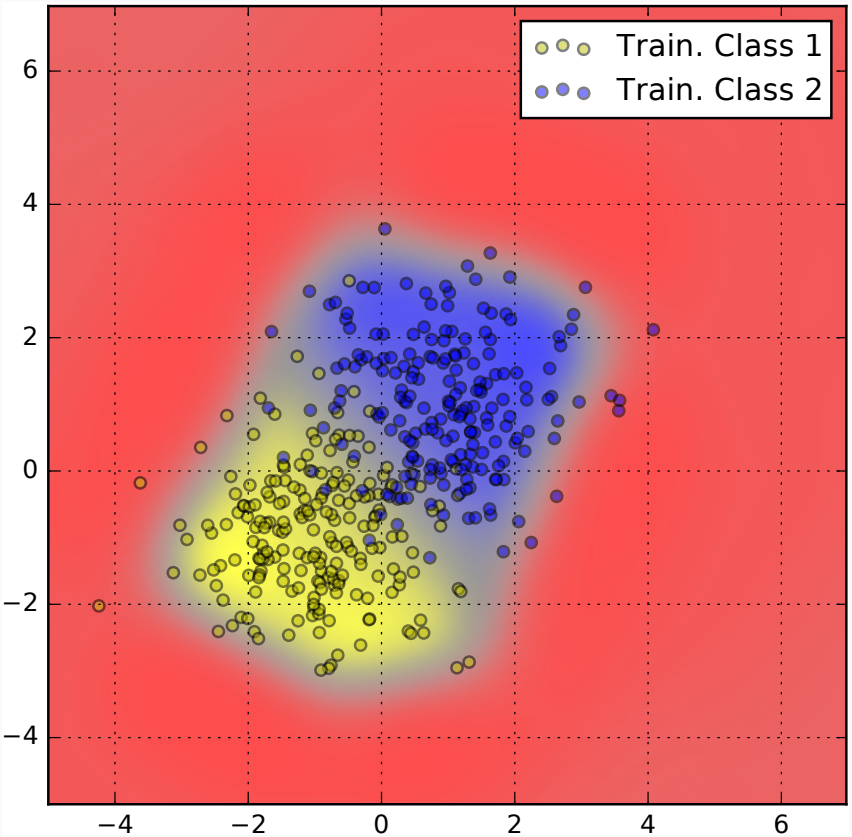

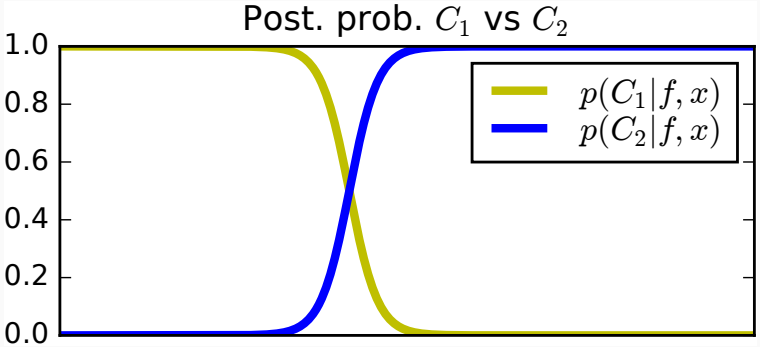

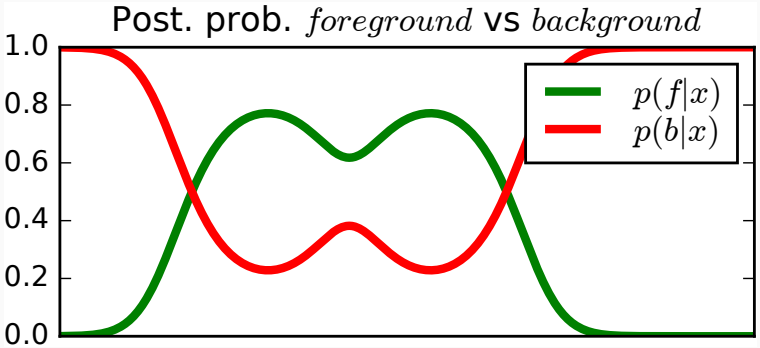

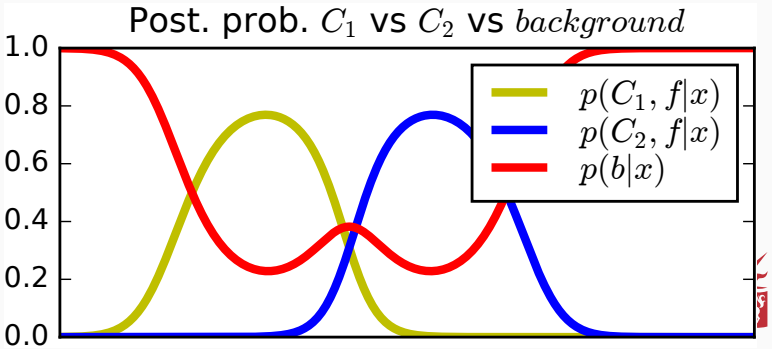

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Performing Background Check

- *Familiarity* approach
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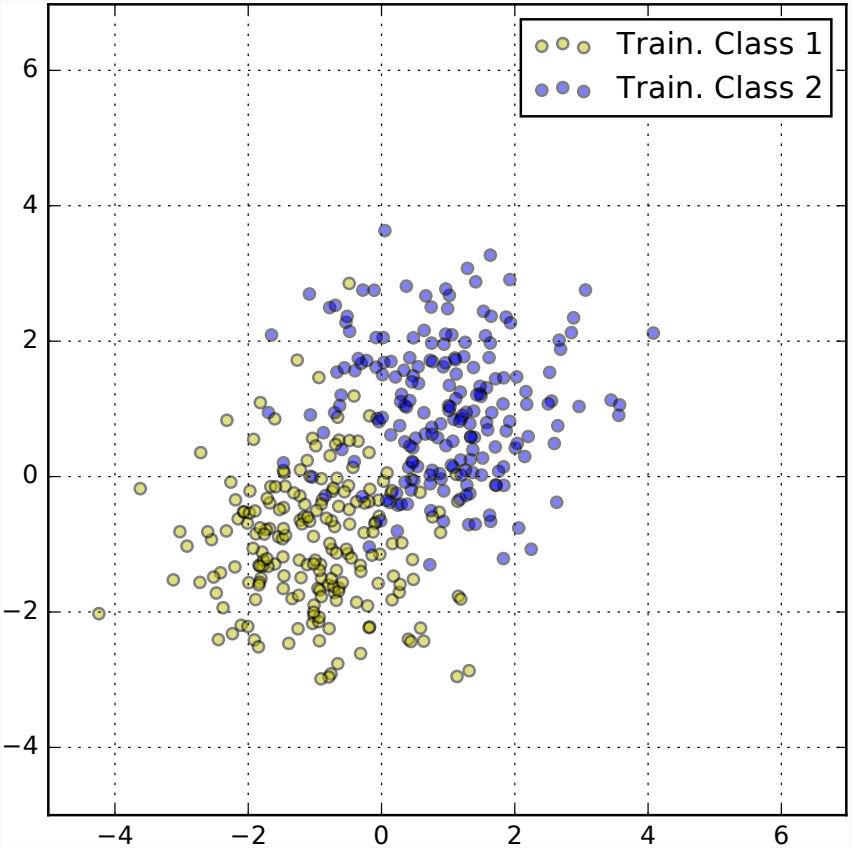
  - Learn $q_f(x) \in [0, 1]$
  - Use inductive bias



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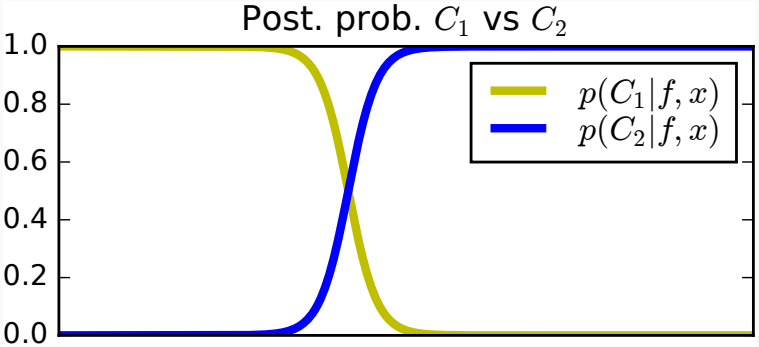

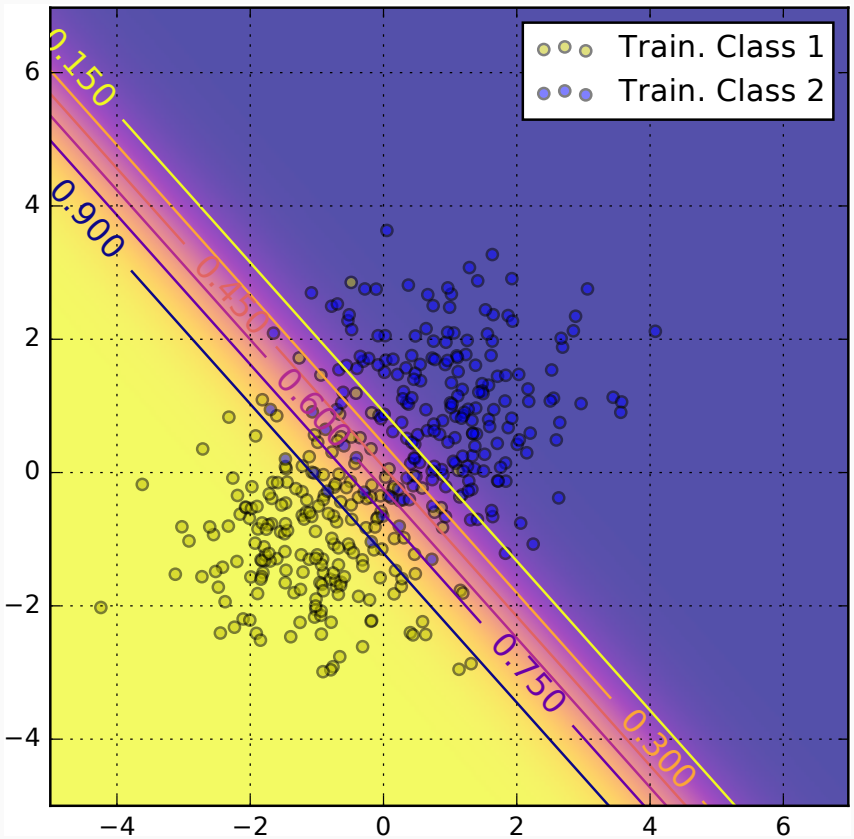

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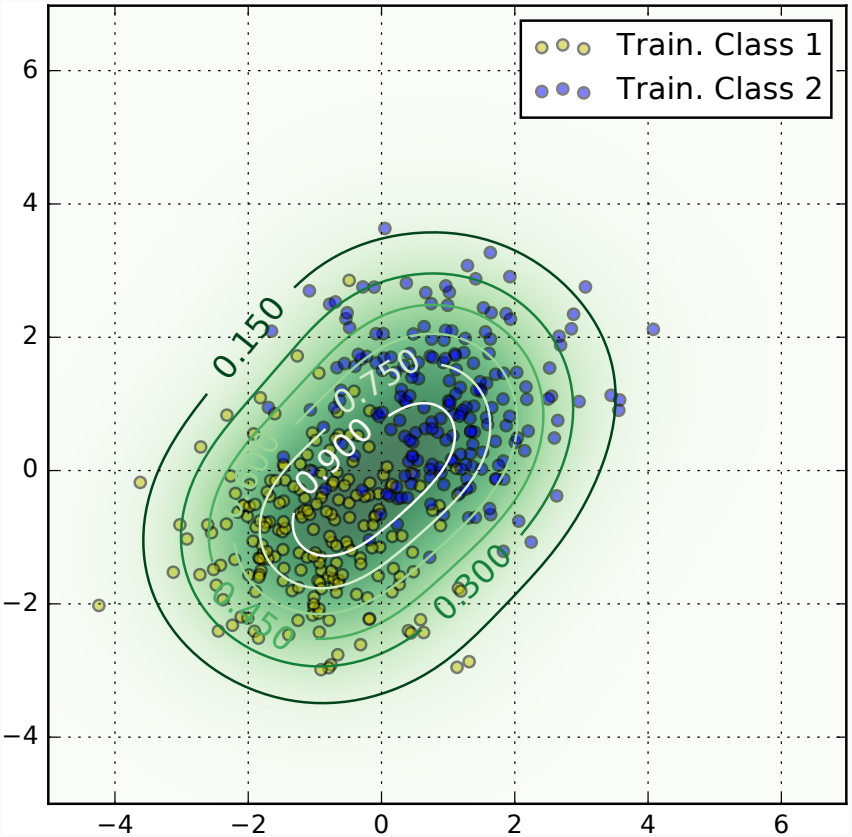

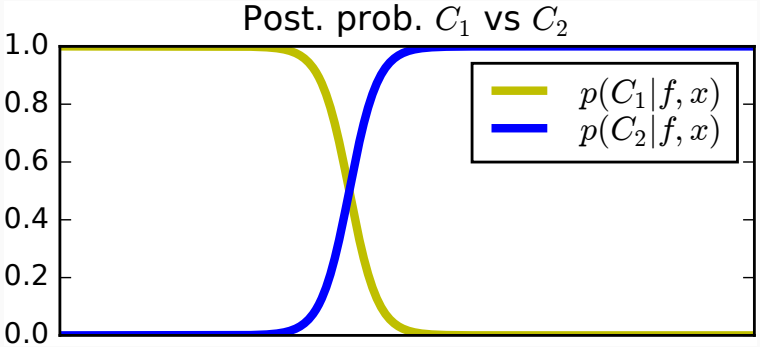

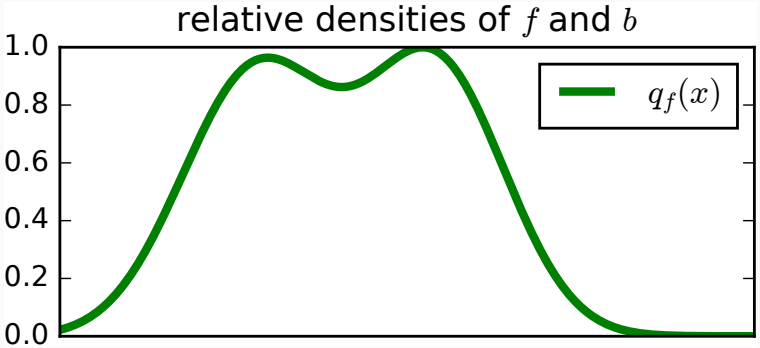

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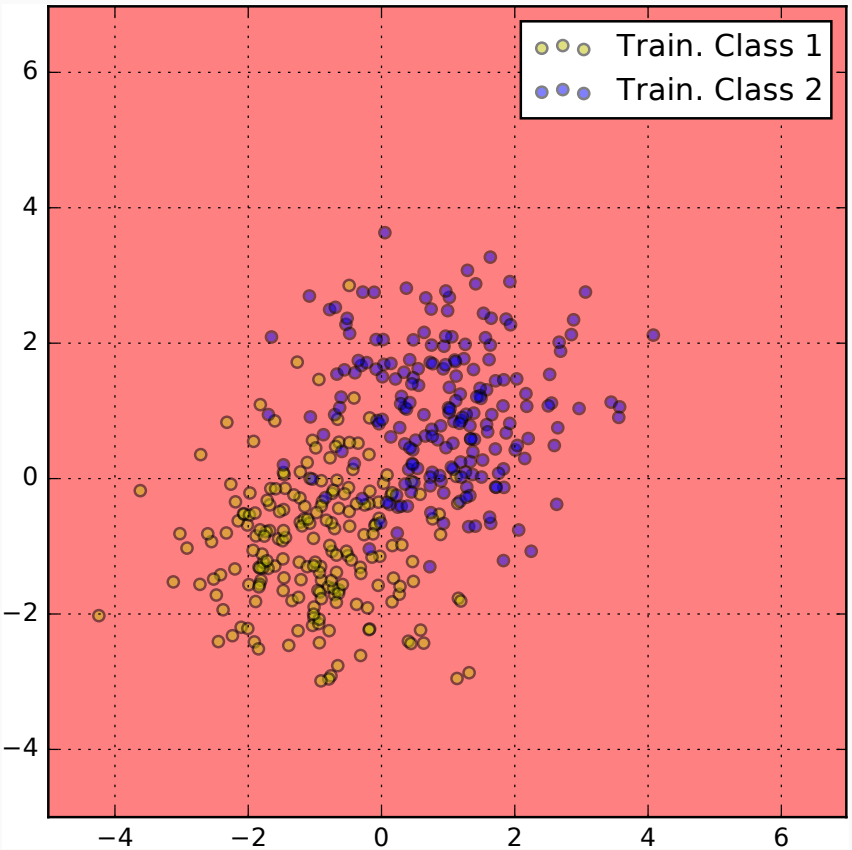

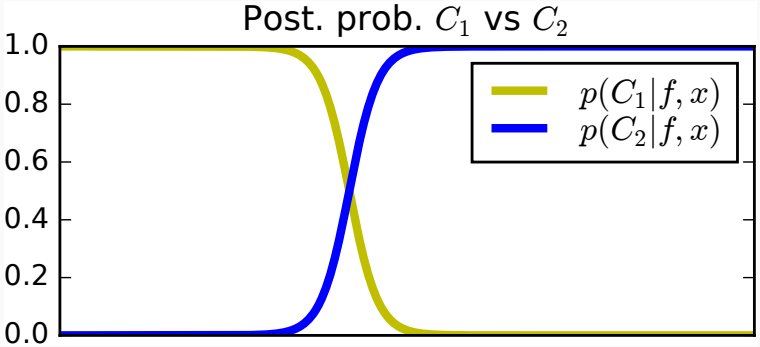

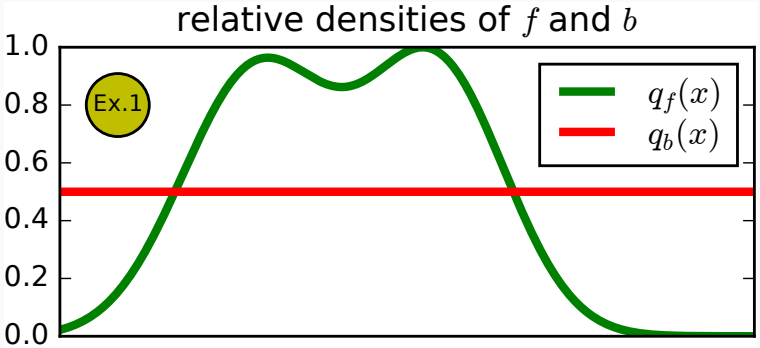

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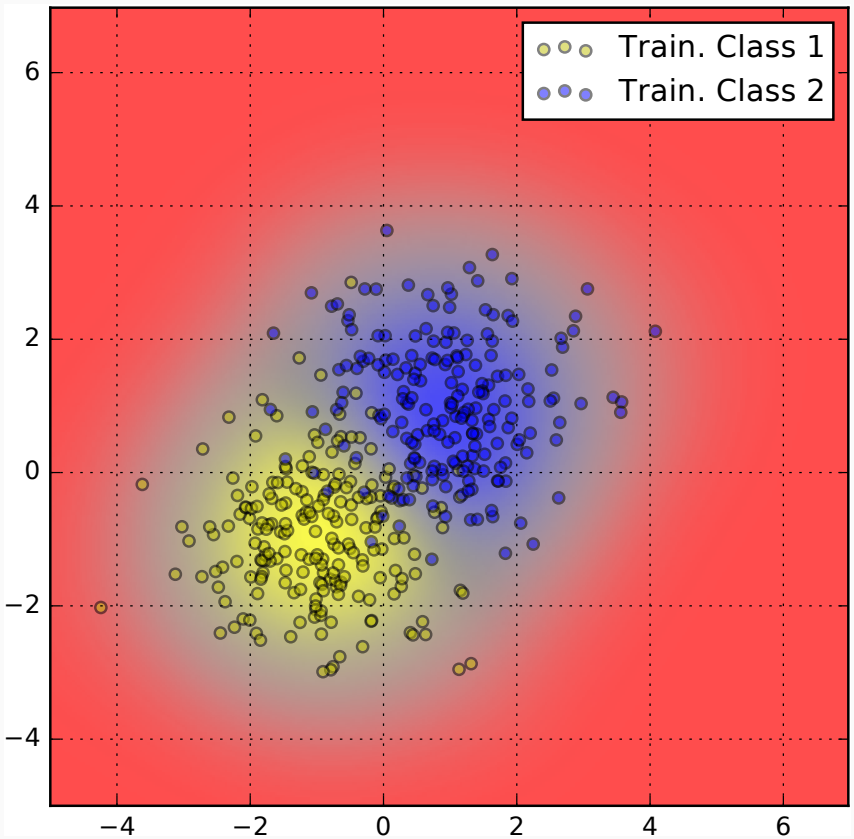

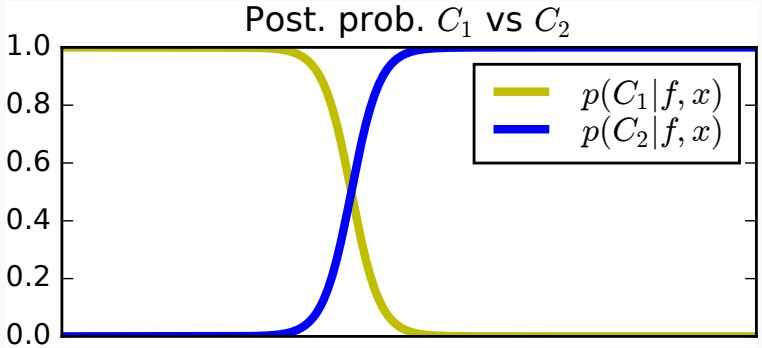

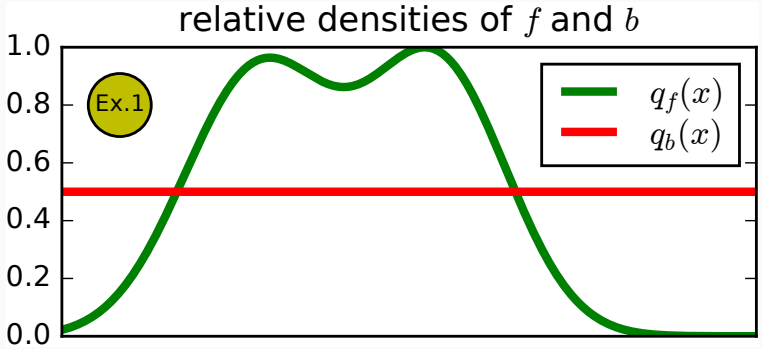

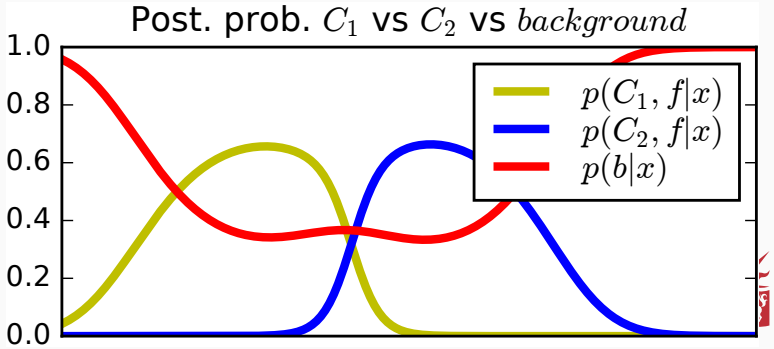

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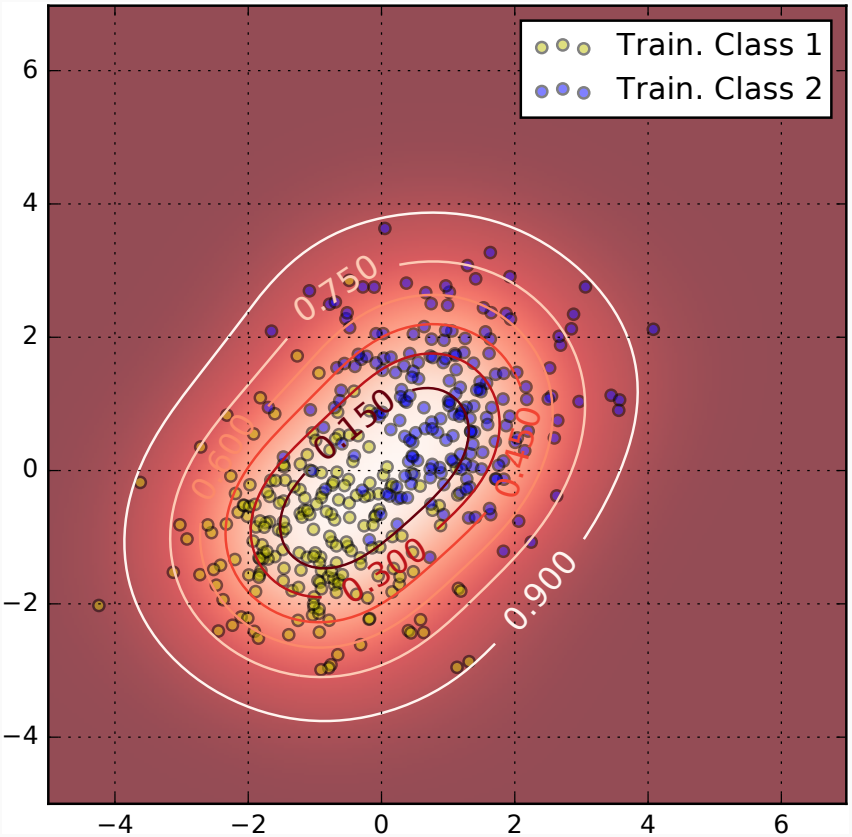

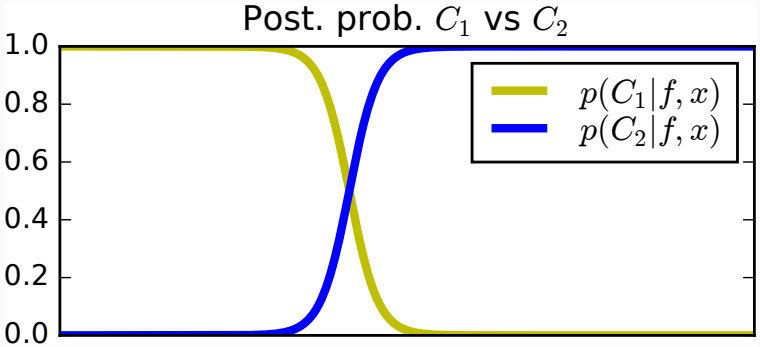

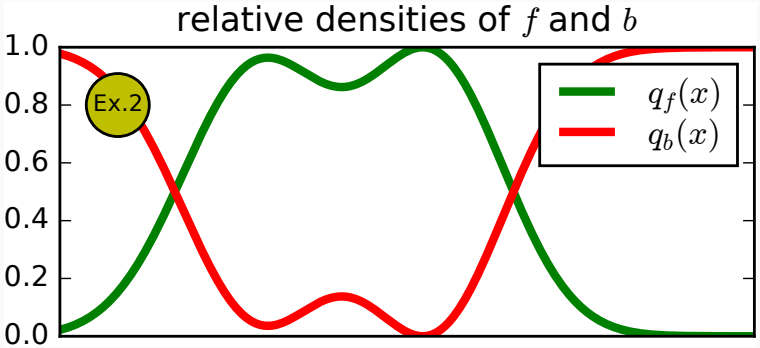

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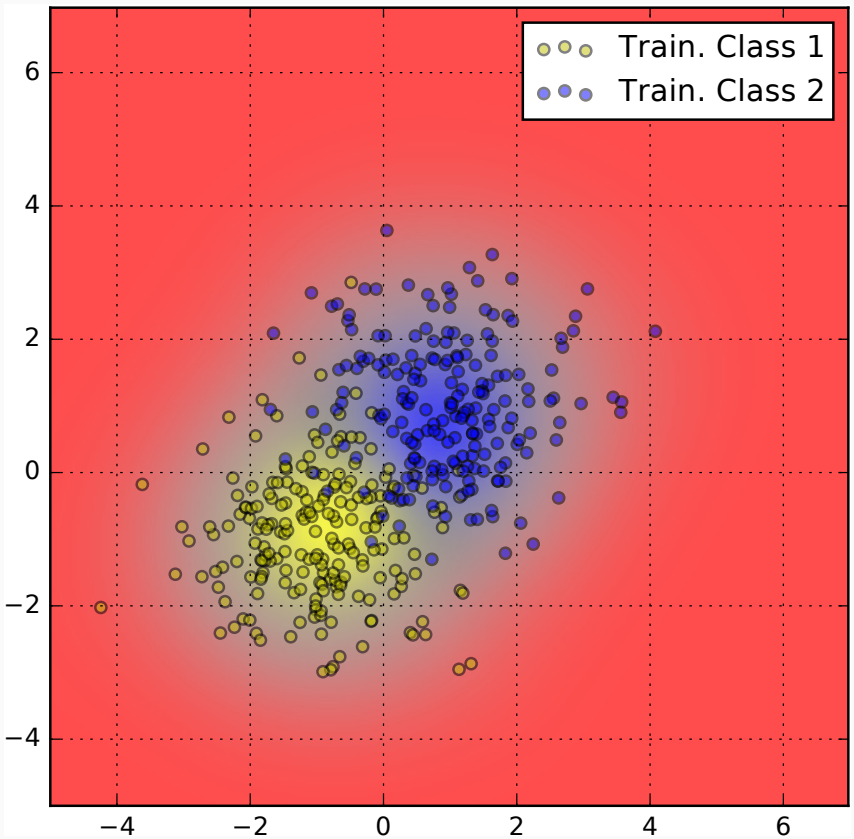

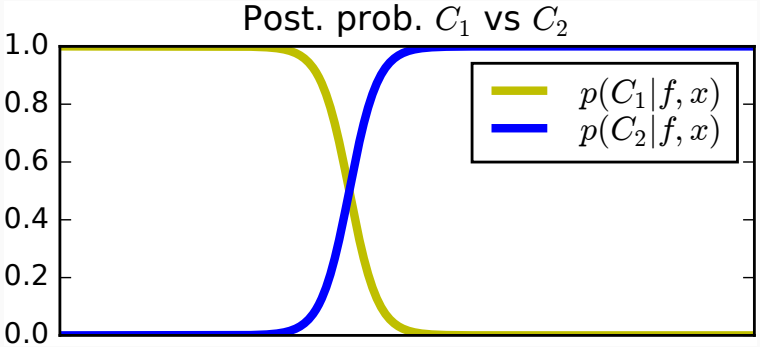

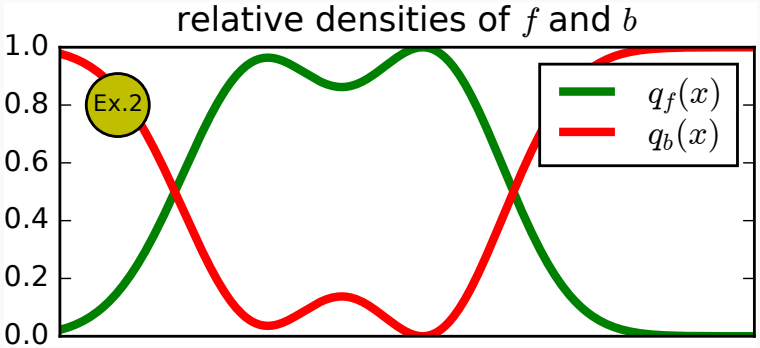

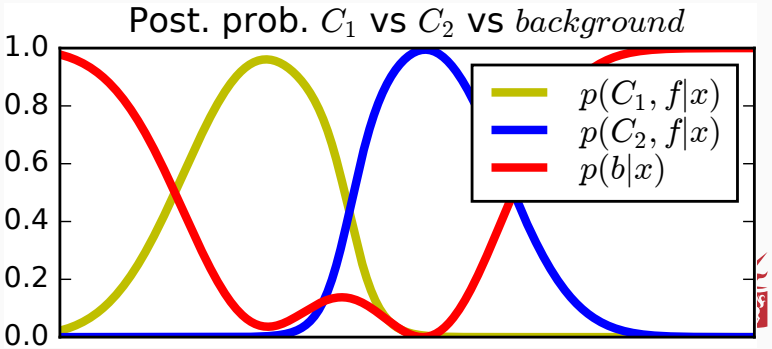

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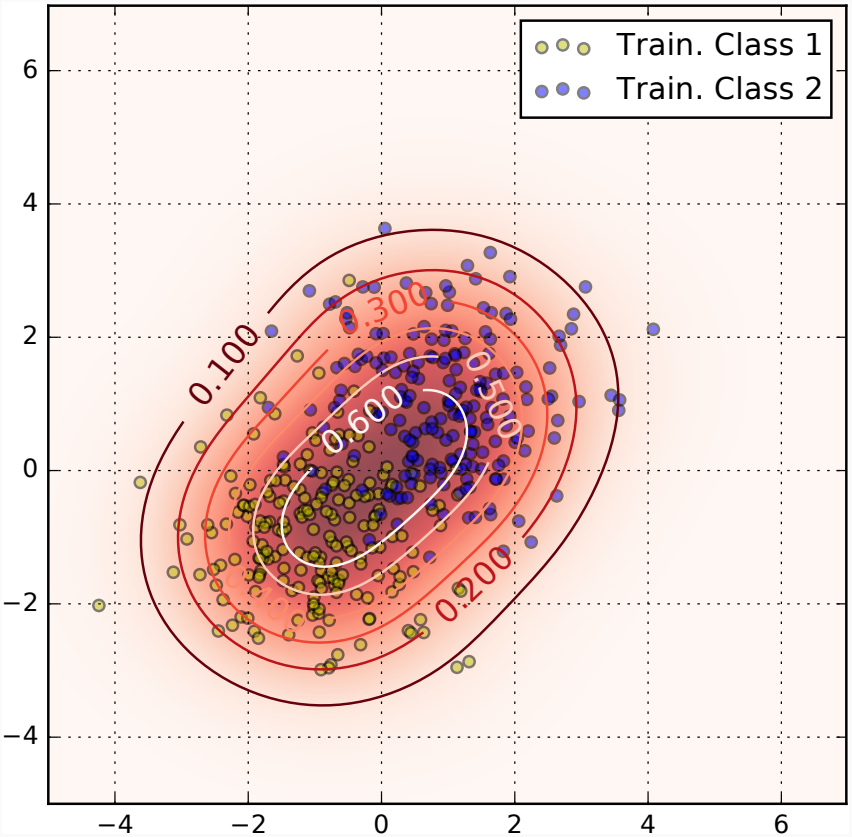

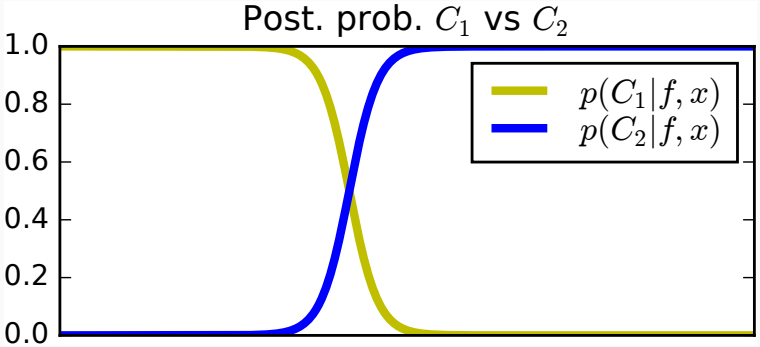

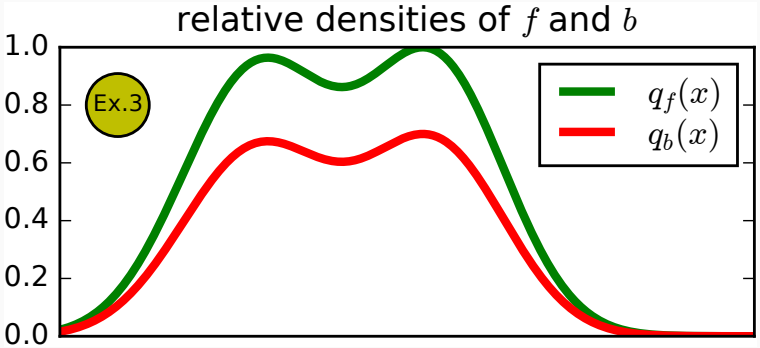

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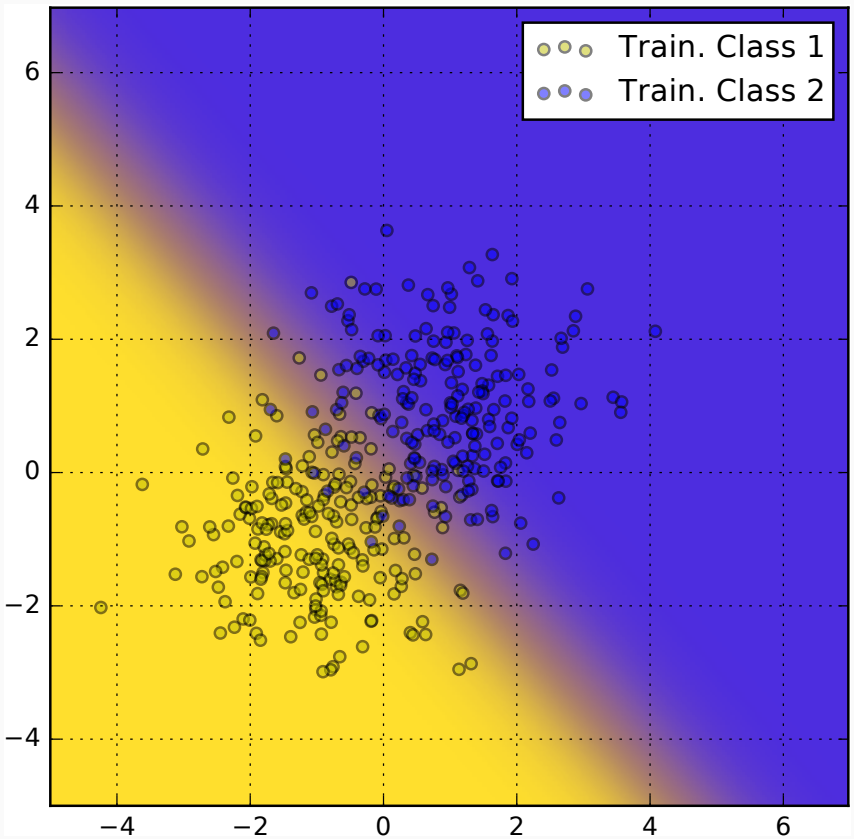

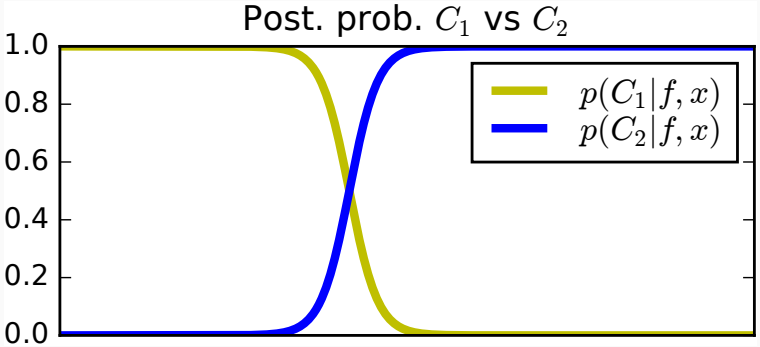

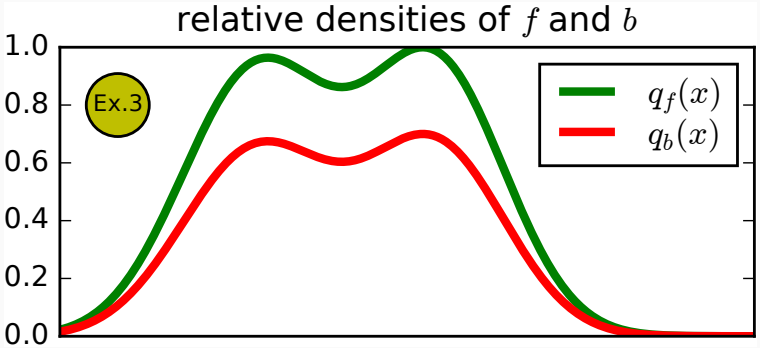

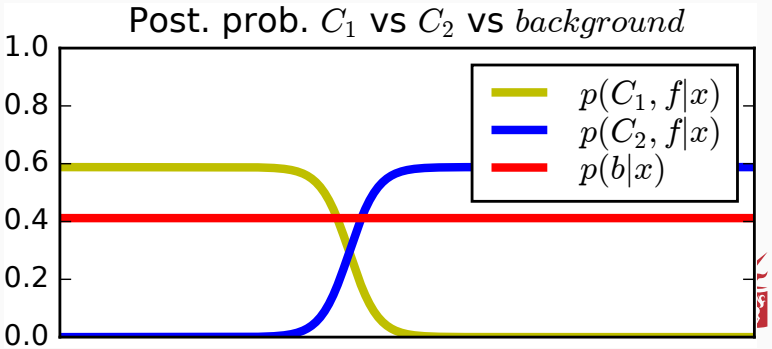

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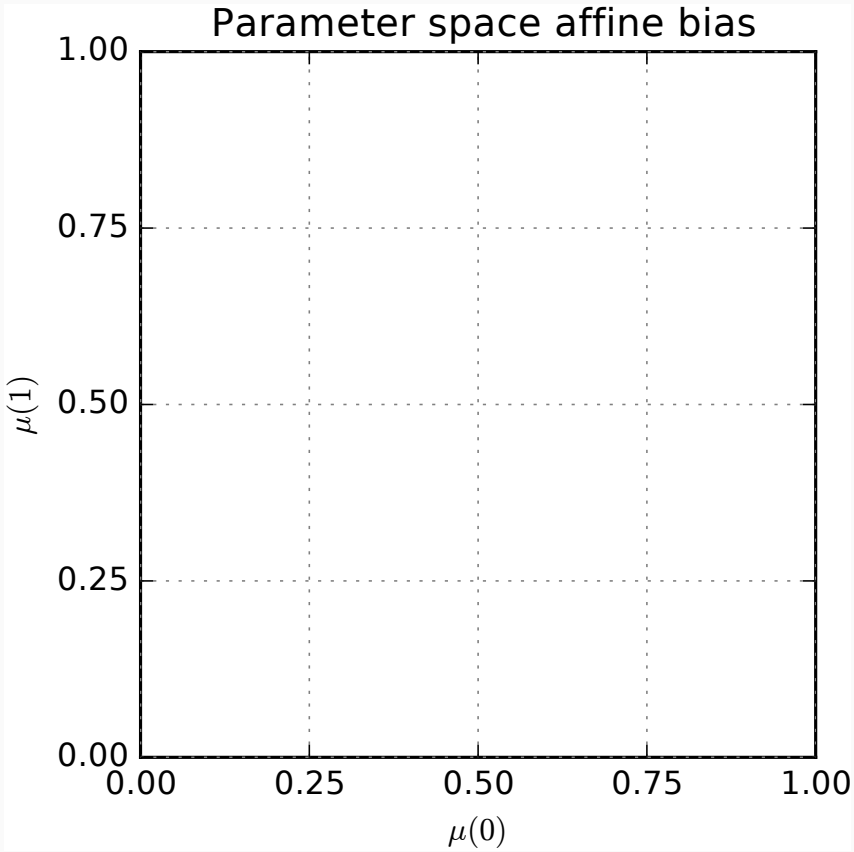

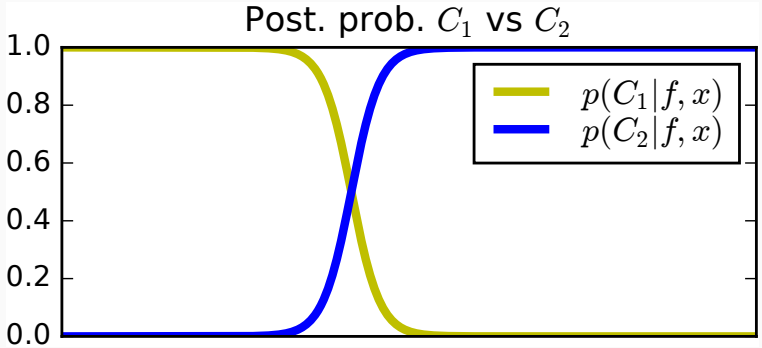

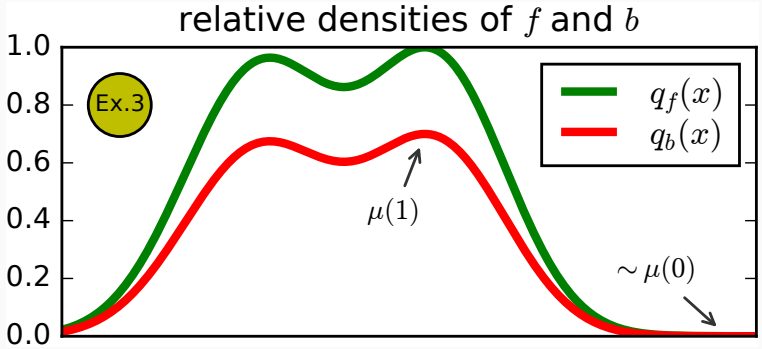

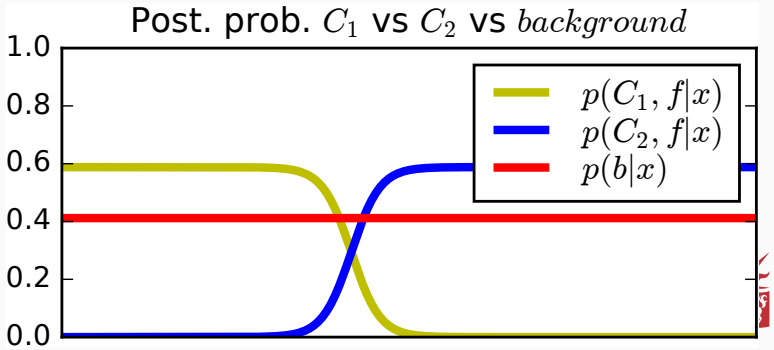

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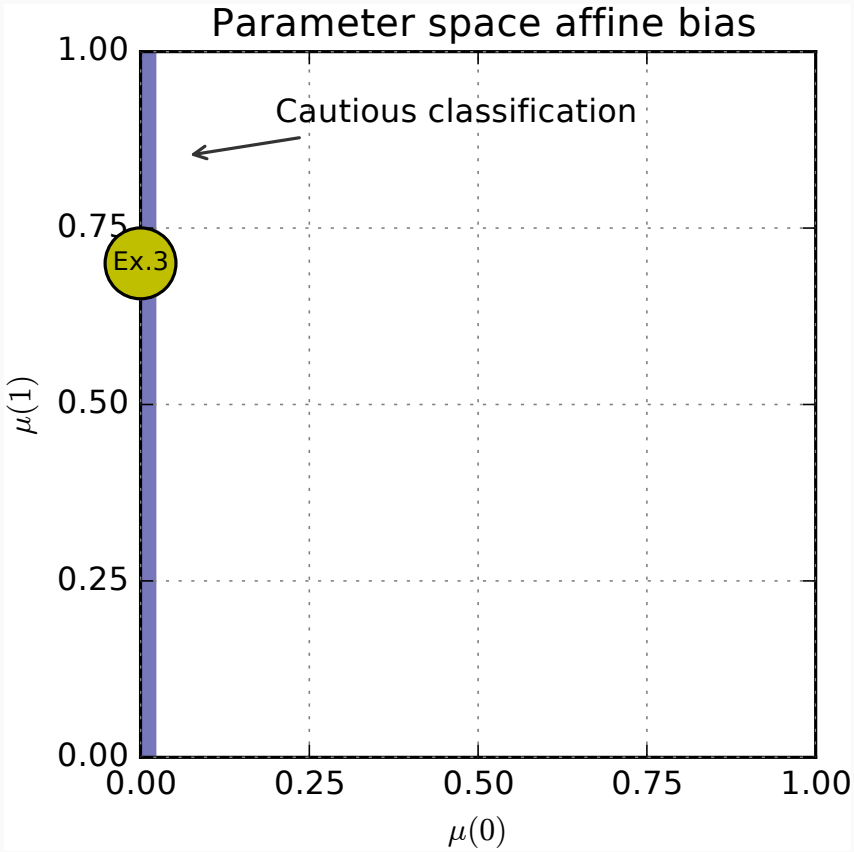

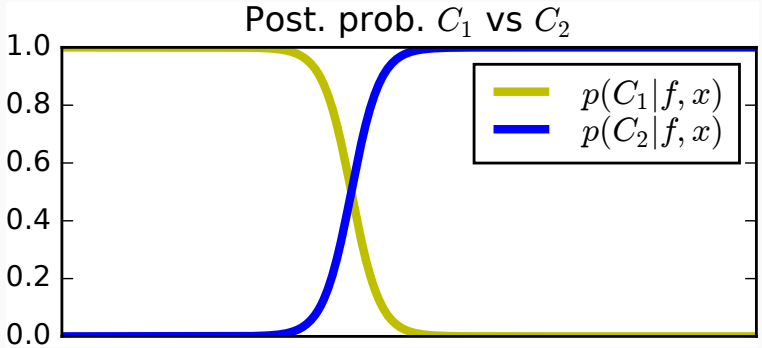

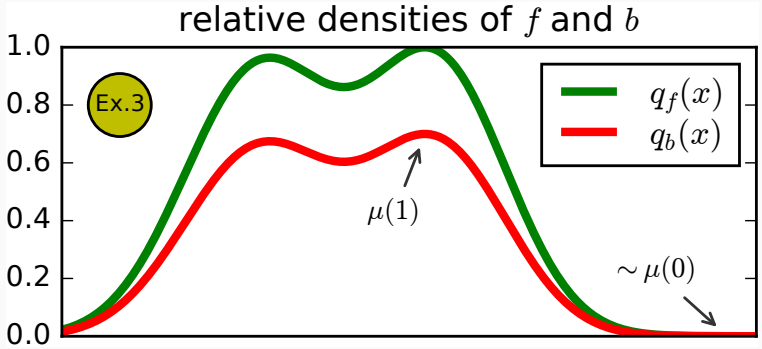

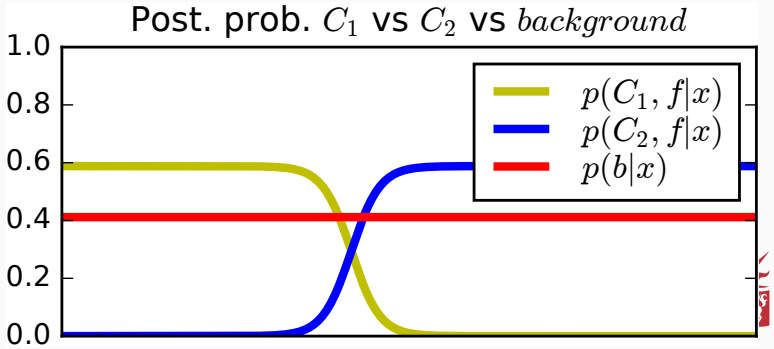

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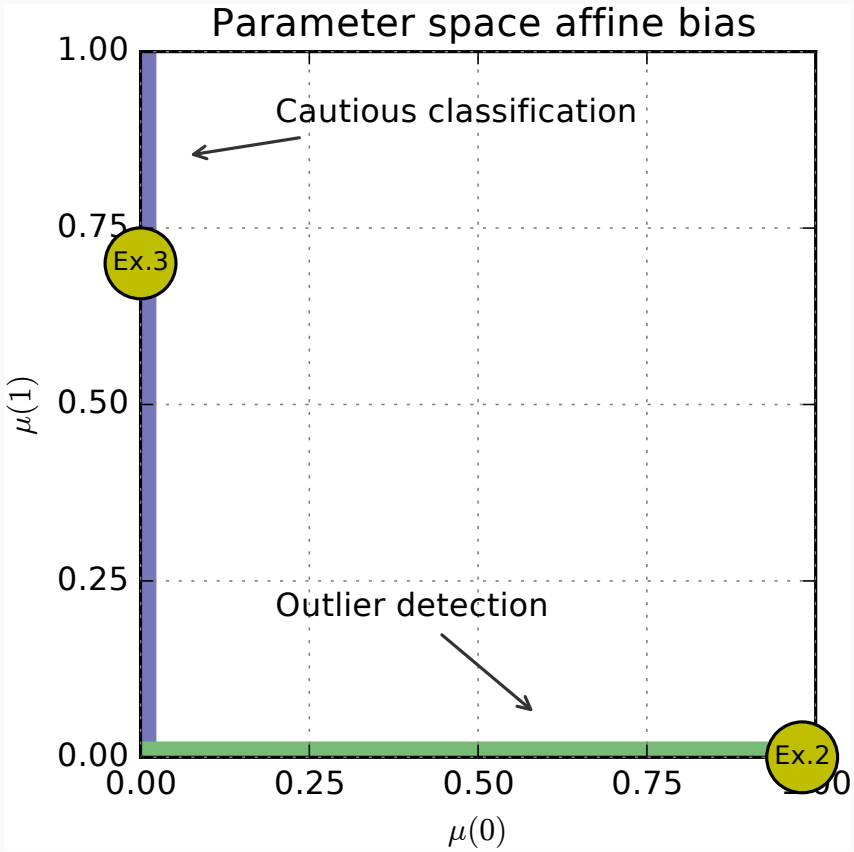

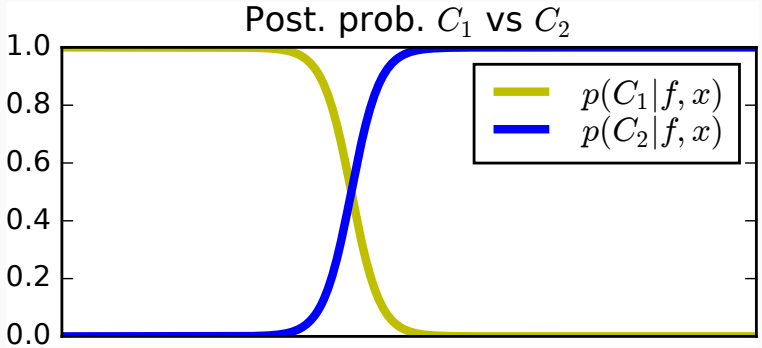

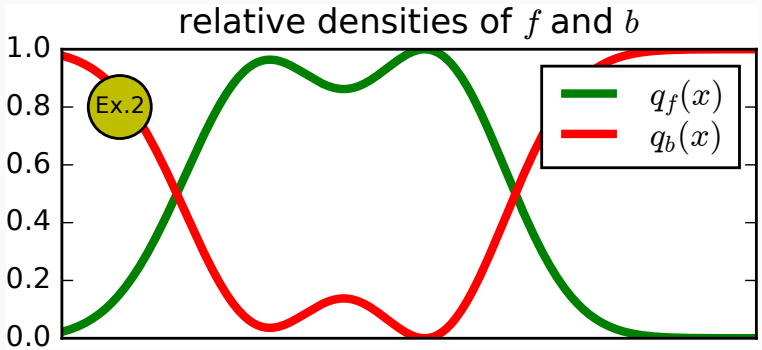

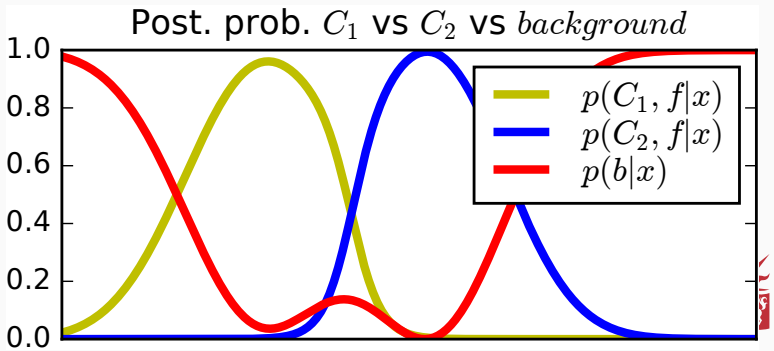

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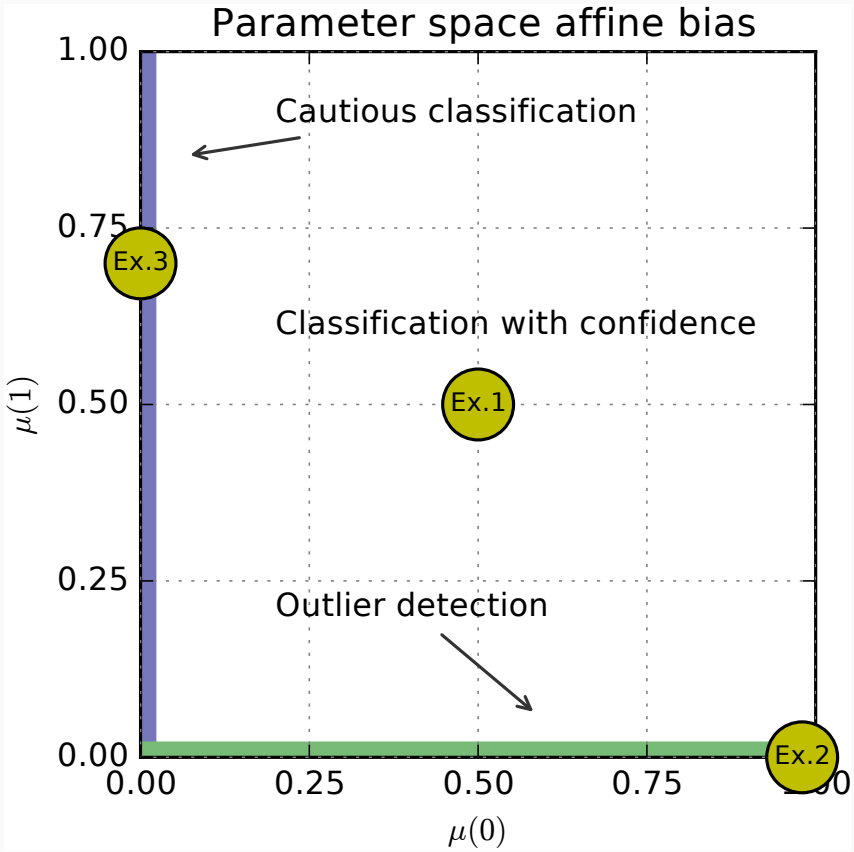

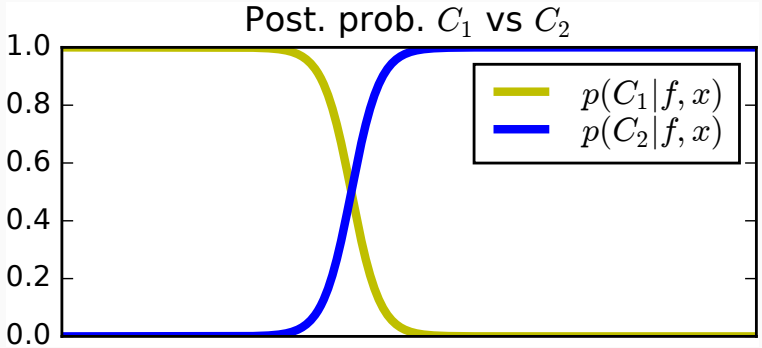

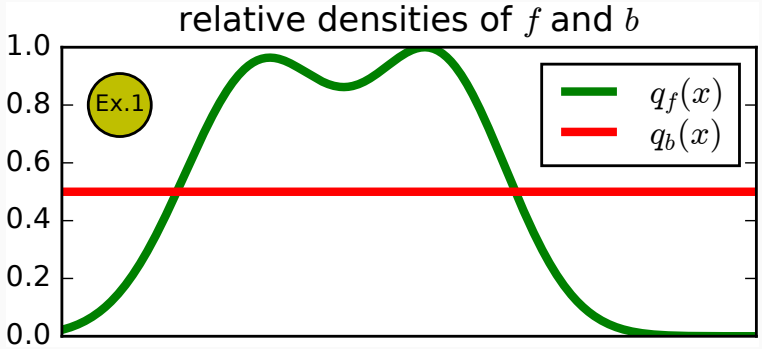

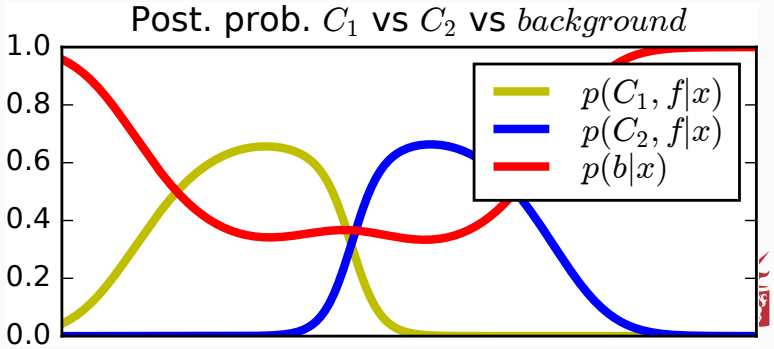

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Background Check: A general technique to build more reliable and versatile classifiers

Miquel Perello-Nieto[*1], Telmo M. Silva Filho[*2], Meelis Kull[1] and Peter Flach[1]

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