

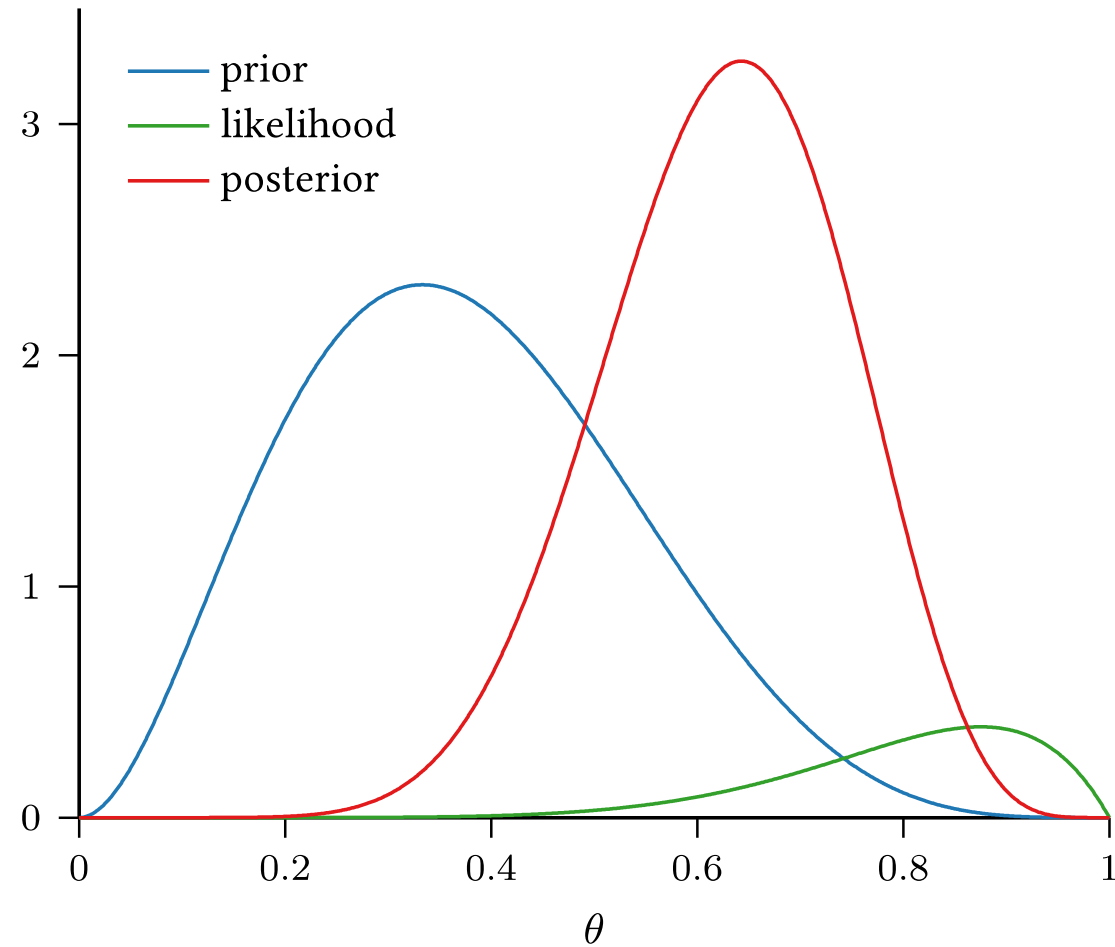
# 10-424/624: Bayesian Methods in ML

## Lecture 1: Supplement & Figures

Henry Chai

1/14/25

# Beta-Bernoulli Conjugacy



Coin flipping example for a Bernoulli likelihood with a Beta prior where  $(\alpha, \beta) = (3, 5)$  and  $(x, n) = (7, 8)$

# Logistics: Course Website

<https://www.cs.cmu.edu/~hchai2/courses/10624/>

# Logistics: Course Syllabus

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- This whole section is **required** reading

# Logistics: Grading

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- 50% Homeworks
- 12% In-class quizzes
- 20% Midterm
- 18% Project
  - 6% Deliverable 1
  - 4% Deliverable 2
  - 8% Deliverable 3

## Logistics: Homework

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- 50% Homeworks
- Most homeworks will consist of a written and a programming component
  - All written assignments must be completed in LaTeX
  - All programming for this course will be done in Python
- Primary difference between 10-424 and 10-624: students enrolled in 10-424 will complete 4 homeworks while students in 10-624 will complete one additional homework (HW624).

# Logistics: Quizzes

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- 50% Homeworks
- 12% In-class quizzes
- We will have 5 short (15 minute) quizzes throughout the semester; we will drop your lowest quiz grade
- These will take place at the beginning of some lectures (mostly Tuesdays)

# Logistics: Midterm

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- 50% Homeworks
- 12% In-class quizzes
- 20% Midterm
- The midterm will take place **in-class on March 20th**



# Logistics: Project

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- 50% Homeworks
- 12% In-class quizzes
- 20% Midterm
- 18% Project
- The project will be a guided exploration of Bayesian optimization
- Students will complete the project individually
- **Tentative:** a (small) portion of the Deliverable 3 grade will be based on your relative performance on a hidden benchmark

# Logistics: Late Policy

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- You have 9 grace days for homework assignments and **project deliverables**
- Only 3 grace days may be used per assessment
- Late submissions w/o grace days will be penalized as:
  - 1 day late = 75% multiplicative penalty
  - 2 days late = 50% multiplicative penalty
  - 3 days late = 25% multiplicative penalty
- No submissions will be accepted more than 3 days late

# Logistics: Collaboration Policy

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- Collaboration on homework assignments is encouraged but must be documented
- **You must always write your own code/answers**
  - You may not use generative AI tools to complete any portion of the assignments
- Good approach to collaborating on assignments:
  1. Collectively work on an impermanent surface, then
  2. Disperse, erase all notes and start from scratch

# Logistics: Technologies

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Syllabus>

- Slack, for course discussion and announcements:

[https://join.slack.com/t/10424624s25co-xx94616/shared\\_invite/zt-2xnf92wi9-vMNkD31eKJA6\\_cmkLz~zug](https://join.slack.com/t/10424624s25co-xx94616/shared_invite/zt-2xnf92wi9-vMNkD31eKJA6_cmkLz~zug)

- Gradescope, for submitting homework assignments:

<https://www.gradescope.com/courses/936155>

- Panopto, for lecture recordings:

<https://scs.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx#folderID=%220e3fdc08-2ad0-4f54-a9fb-b25d0124b348%22>

# Logistics: Schedule

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Schedule>

Date	Topic	Notes/Slides	Readings/Resources
Tue, 1/14	Course Overview and the Bayesian Method		
Thu, 1/16	Bayesian Inference: Hypothesis Testing		
Tue, 1/21	Bayesian Inference: Decision Theory		
Thu, 1/23	The Gaussian Distribution		
Tue, 1/28	Quiz 1 (Lectures 1 - 4)		
	Bayesian Linear Regression		
Thu, 1/30	Bayesian Logistic Regression & the Laplace Approximation		
Tue, 2/4	The Kernel Trick		
Thu, 2/6	Gaussian Process Regression		
Tue, 2/11	Quiz 2 (Lectures 5 - 8)		
	Gaussian Process Classification and Assumed Density Filtering		

# Logistics: Recitations

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Recitations>

Date	Topic	Handout	Solutions
Fri, 1/17	Probability Review Recitation		
Fri, 1/24	HW1 Recitation		
Fri, 1/31	No Recitation		
Fri, 2/7	HW2 Recitation		
Fri, 2/14	No Recitation		
Fri, 2/21	HW3 Recitation		

# Logistics: Office Hours

<https://www.cs.cmu.edu/~hchai2/courses/10624/#Calendar>

## Course Calendar

Today < > January 2025							Month
SUN 29	MON 30	TUE 31	WED Jan 1	THU 2	FRI 3	SAT 4	
5	6	7	8	9	10	11	
12	13	14 • 9:30am Lecture	15	16 • 9:30am Lecture	17 • 9:30am Recitati	18	
19	20	21 • 9:30am Lecture	22	23 • 9:30am Lecture	24 • 9:30am Recitati	25	
26	27	28 • 9:30am Lecture	29	30 • 9:30am Lecture	31	Feb 1	