LLM Benchmarking Analysis - Executive Summary

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COMPREHENSIVE LLM BENCHMARKING ANALYSIS - SUMMARY REPORT
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DATASET OVERVIEW:
  • Total Records: 121
  • Model Families: Qwen, Gemma/Gemini, Granite, Llama, GPT, Mistral
  • Hospitals: hospital1, hospital2
  • Vision-enabled Models: 49
  • Text-only Models: 72
  • Ollama Models: 70
  • Commercial Models: 51

TOP PERFORMERS:
  • qwen2.5vl3b*ImageInput* (Qwen, 3.0B, Vision)
    F1: 98.86, Accuracy: 98.86
  • qwen2.5:72b (Qwen, 72.0B, Text-only)
    F1: 96.55, Accuracy: 95.45
  • llama-4-scout (Llama, Unknown, Text-only)
    F1: 90.80, Accuracy: 84.09
  • gemini-2.0 (Gemma/Gemini, Unknown, Text-only)
    F1: 90.59, Accuracy: 87.50
  • devstral-small (Mistral, Unknown, Text-only)
    F1: 90.17, Accuracy: 88.64

FAMILY PERFORMANCE RANKING (by F1 Score):
  • Mistral: 82.95 (n=3.0)
  • Gemma/Gemini: 62.31 (n=26.0)
  • GPT: 61.30 (n=34.0)
  • Llama: 58.41 (n=17.0)
  • Qwen: 57.27 (n=27.0)
  • Granite: 48.18 (n=14.0)

KEY INSIGHTS:
  • Vision Models Avg F1: 54.54
  • Text-only Models Avg F1: 62.43
  • Hospital 1 Avg F1: 60.39
  • Hospital 2 Avg F1: 57.98
  • Ollama Models Avg F1: 52.73
  • Commercial Models Avg F1: 68.16

Grouped Model F1 Score Statistics:
  • Unique Base Models: 16
  • Total Test Instances: 121
  • Best Performing Model: qwen2.5:72b (F1: 89.61)
  • Worst Performing Model: qwen31.7b (F1: 38.54)
  • Overall Average F1: 63.15
  • Models with Vision: 6

Top 5 Performers:
  • llama-4-scout (Llama, Text-only): F1 = 68.98 ± 38.73
  • mistral-3.1-24b (Mistral, Text-only): F1 = 77.48 ± nan
  • devstral-small (Mistral, Text-only): F1 = 85.69 ± 6.34
  • gemini-2.0 (Gemma/Gemini, Text-only): F1 = 87.53 ± 3.53
  • qwen2.5:72b (Qwen, Text-only): F1 = 89.61 ± 5.11

Bottom 5 Performers:
  • qwen31.7b (Qwen, Text-only): F1 = 38.54 ± 29.88
  • llama3.21b (Llama, Text-only): F1 = 44.97 ± 23.45
  • granite3.2 (Granite, with Vision): F1 = 46.89 ± 18.80
  • gpt-4o (GPT, with Vision): F1 = 51.23 ± 22.82
  • gemma34b (Gemma/Gemini, with Vision): F1 = 52.50 ± 10.01

Error Analysis Summary:
  • Average False Positives: 16.64
  • Average False Negatives: 28.50
  • Models with more FP than FN: 20
  • Models with more FN than FP: 89

SOURCE CATEGORY DETAILED STATISTICS:

COMMERCIAL MODELS:
  GPT:
    Accuracy: 48.8±13.2 (n=34)
    F1 Score: 61.3±14.0
    Precision: 78.9±19.6
    False Positives: 8.8
    False Negatives: 28.0
  Gemma/Gemini:
    Accuracy: 82.1±4.9 (n=4)
    F1 Score: 87.5±3.5
    Precision: 87.0±3.0
    False Positives: 10.8
    False Negatives: 9.8
  Llama:
    Accuracy: 61.7±34.8 (n=5)
    F1 Score: 69.0±38.7
    Precision: 71.0±39.9
    False Positives: 23.8
    False Negatives: 27.2
  Mistral:
    Accuracy: 77.0±11.3 (n=3)
    F1 Score: 83.0±6.5
    Precision: 80.6±8.8
    False Positives: 14.3
    False Negatives: 10.0
  Qwen:
    Accuracy: 83.2±9.0 (n=5)
    F1 Score: 89.6±5.1
    Precision: 89.0±5.1
    False Positives: 8.2
    False Negatives: 7.0

OLLAMA MODELS:
  Gemma/Gemini:
    Accuracy: 48.1±12.0 (n=22)
    F1 Score: 57.7±12.5
    Precision: 63.2±17.0
    False Positives: 18.7
    False Negatives: 26.5
  Granite:
    Accuracy: 36.4±18.0 (n=14)
    F1 Score: 48.2±20.2
    Precision: 64.0±29.9
    False Positives: 18.8
    False Negatives: 35.7
  Llama:
    Accuracy: 42.2±17.1 (n=12)
    F1 Score: 54.0±20.0
    Precision: 67.3±24.4
    False Positives: 17.6
    False Negatives: 34.2
  Qwen:
    Accuracy: 41.5±21.1 (n=22)
    F1 Score: 49.9±22.9
    Precision: 55.2±25.1
    False Positives: 26.5
    False Negatives: 34.6


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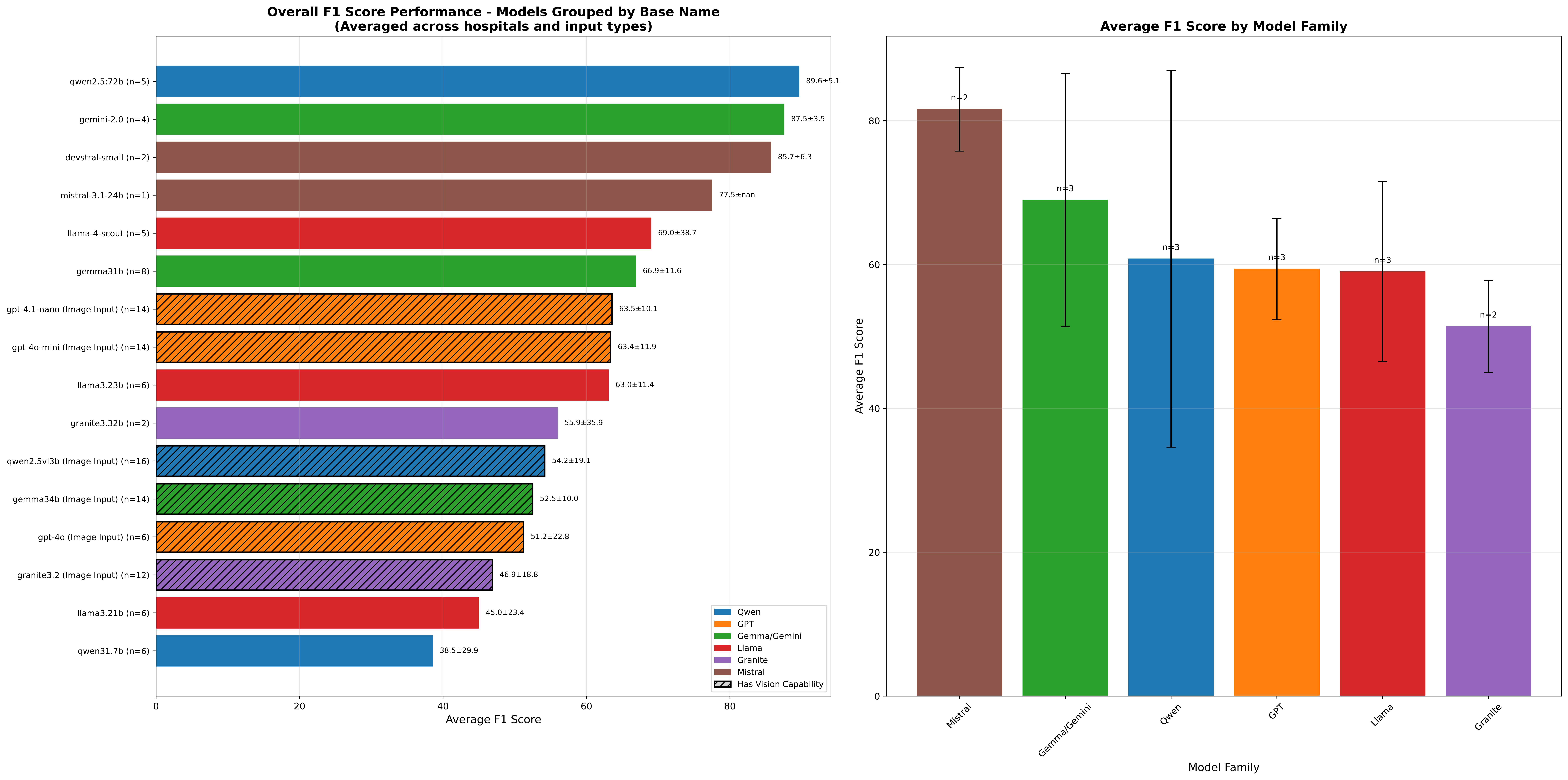
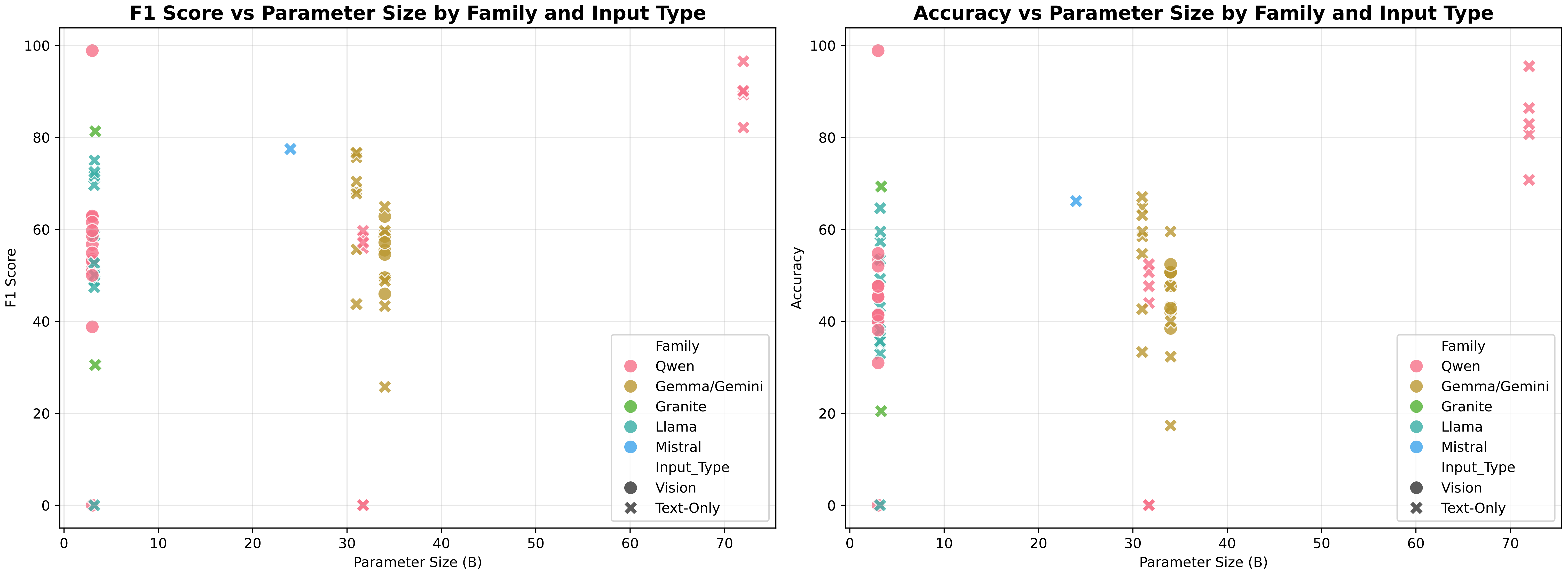
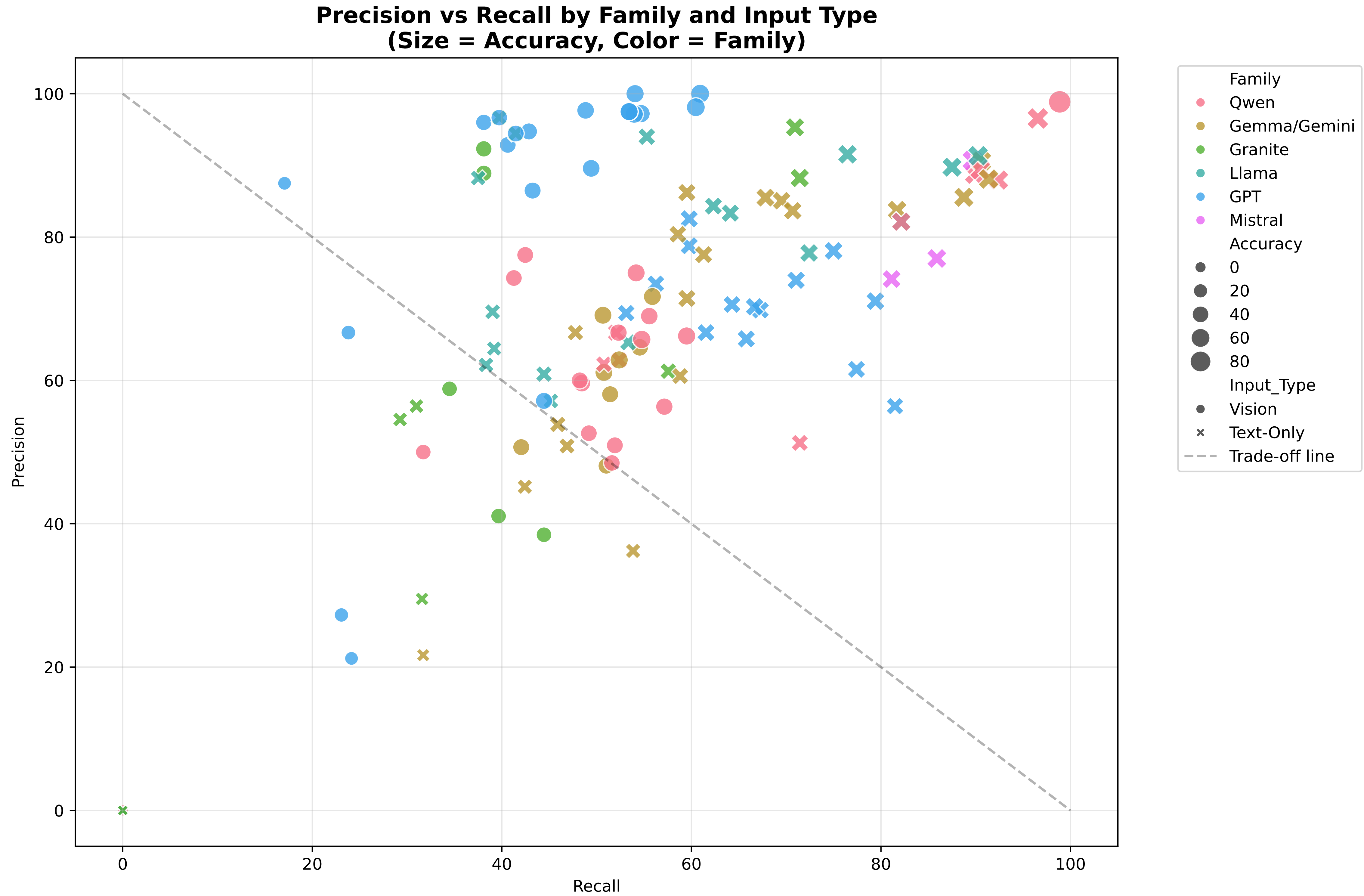
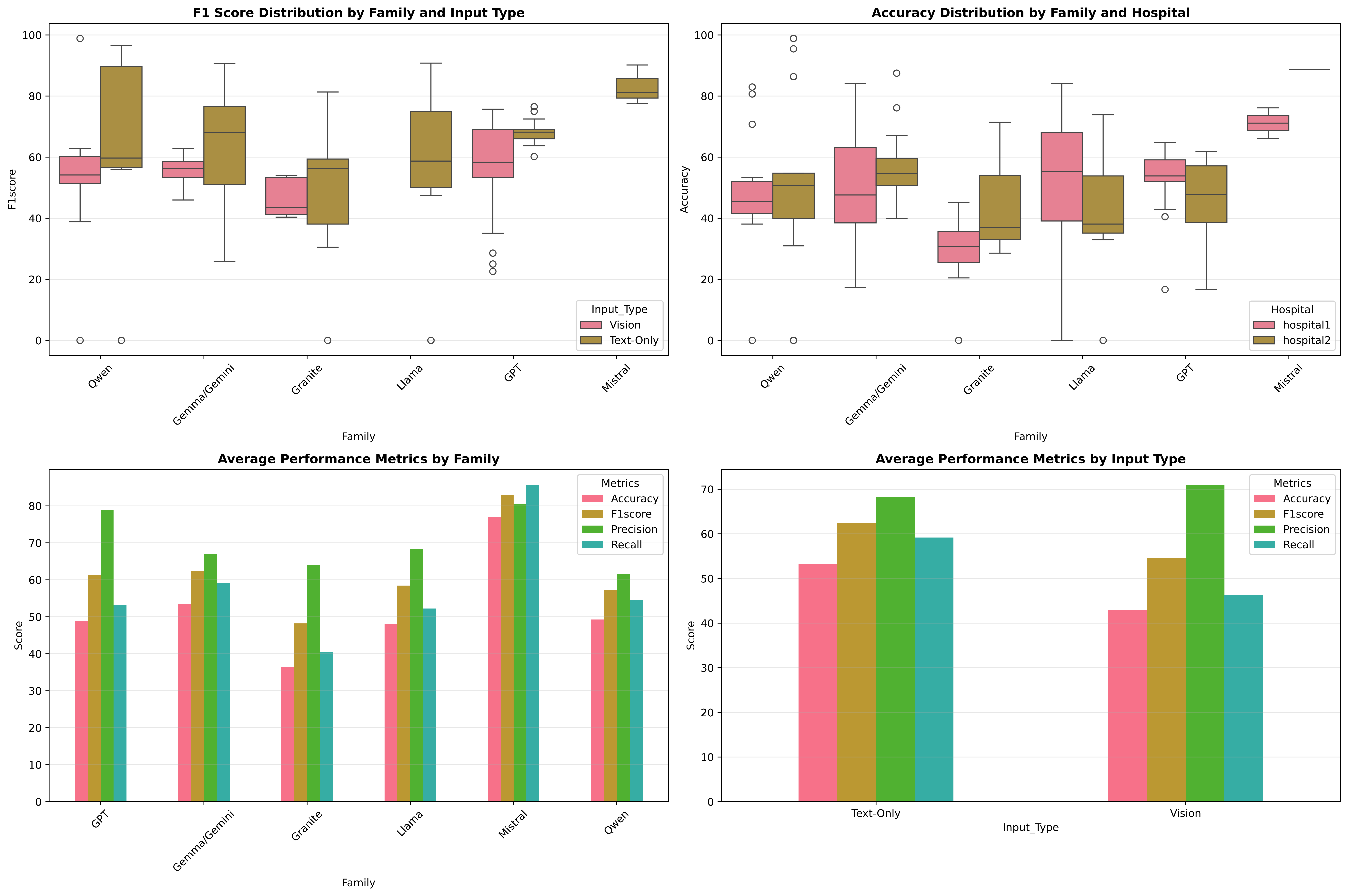


Overall F1 Score Performance - Models Grouped by Base Name
(Averaged across hospitals and input types)
qwen2.5:72b (n=5)
89.6±5.1
gemini-2.0 (n=4)
87.5±3.5
devstral-small (n=2)
85.7±6.3
mistral-3.1-24b (n=1)
77.5±nan
llama-4-scout (n=5)
69.0±38.7
gemma31b (n=8)
66.9±11.6
gpt-4.1-nano (Image Input) (n=14)
63.5±10.1
gpt-4o-mini (Image Input) (n=14)
63.4±11.9
llama3.23b (n=6)
63.0±11.4
granite3.32b (n=2)
55.9±35.9
qwen2.5vl3b (Image Input) (n=16)
54.2±19.1
gemma34b (Image Input) (n=14)
52.5±10.0
gpt-4o (Image Input) (n=6)
51.2±22.8
granite3.2 (Image Input) (n=12)
46.9±18.8
llama3.21b (n=6)
45.0±23.4
qwen31.7b (n=6)
38.5±29.9
0
20
40
60
80
Average F1 Score
Qwen
GPT
Gemma/Gemini
Llama
Granite
Mistral
Has Vision Capability
Average F1 Score by Model Family
Average F1 Score
0
20
40
60
80
n=2
n=3
n=3
n=3
n=3
n=2
Mistral
Gemma/Gemini
Qwen
GPT
Llama
Granite
Model Family



F1 Score vs Parameter Size by Family and Input Type
F1 Score
Parameter Size (B)
0
20
40
60
80
100
0
10
20
30
40
50
60
70
Accuracy vs Parameter Size by Family and Input Type
Accuracy
Parameter Size (B)
Family
Qwen
Gemma/Gemini
Granite
Llama
Mistral
Input_Type
Vision
Text-Only

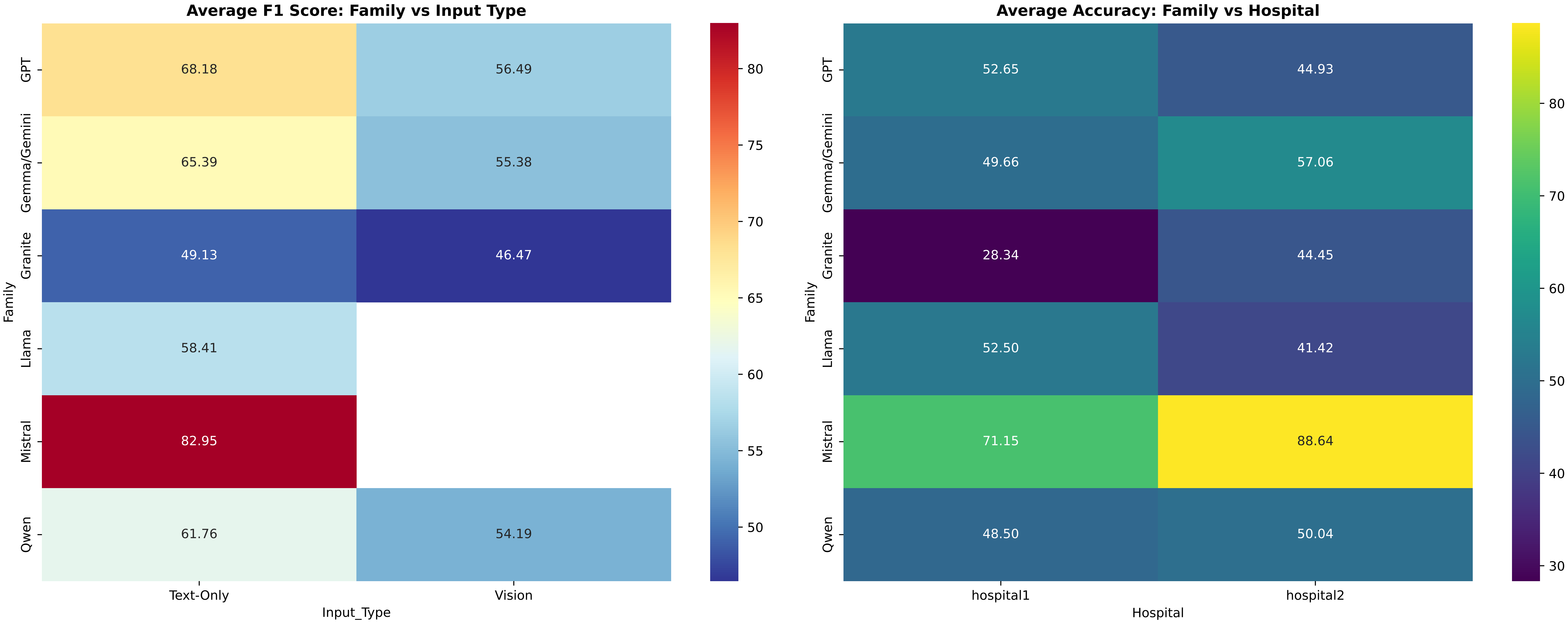

Precision vs Recall by Family and Input Type
(Size = Accuracy, Color = Family)
Precision
Recall
0
20
40
60
80
100
Family
Qwen
Gemma/Gemini
Granite
Llama
GPT
Mistral
Accuracy
0
20
40
60
80
Input_Type
Vision
Text-Only
Trade-off line

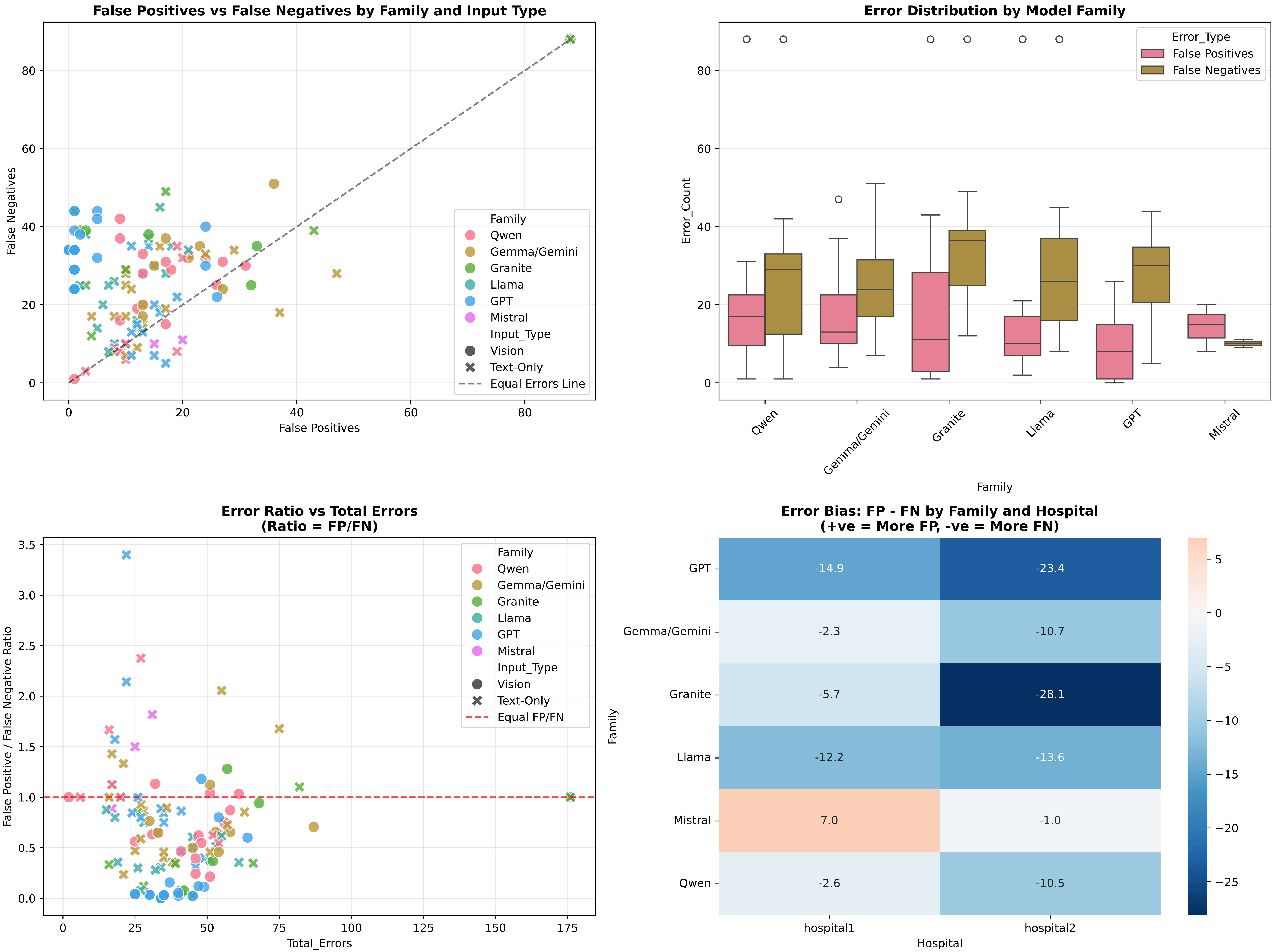

F1 Score Distribution by Family and Input Type

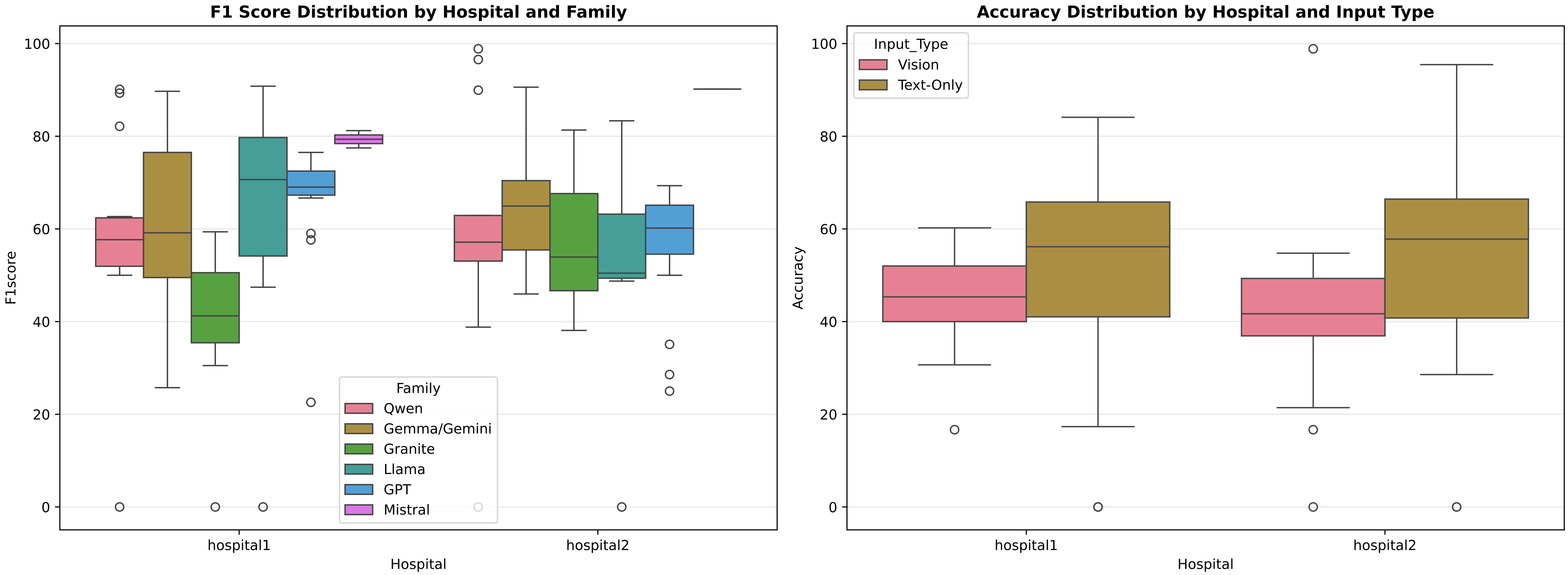
Accuracy Distribution by Family and Hospital

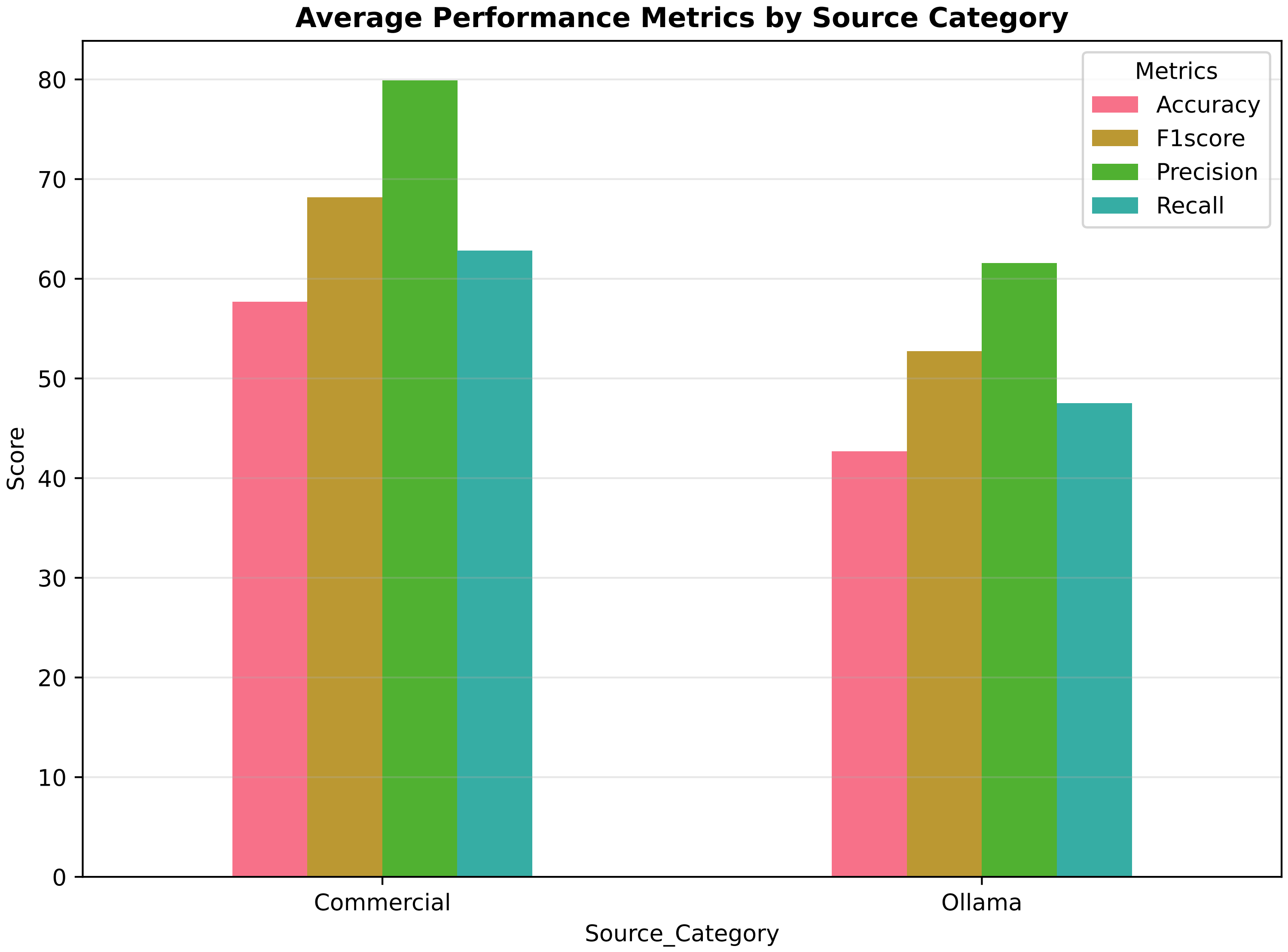
Average Performance Metrics by Family

Average Performance Metrics by Input Type

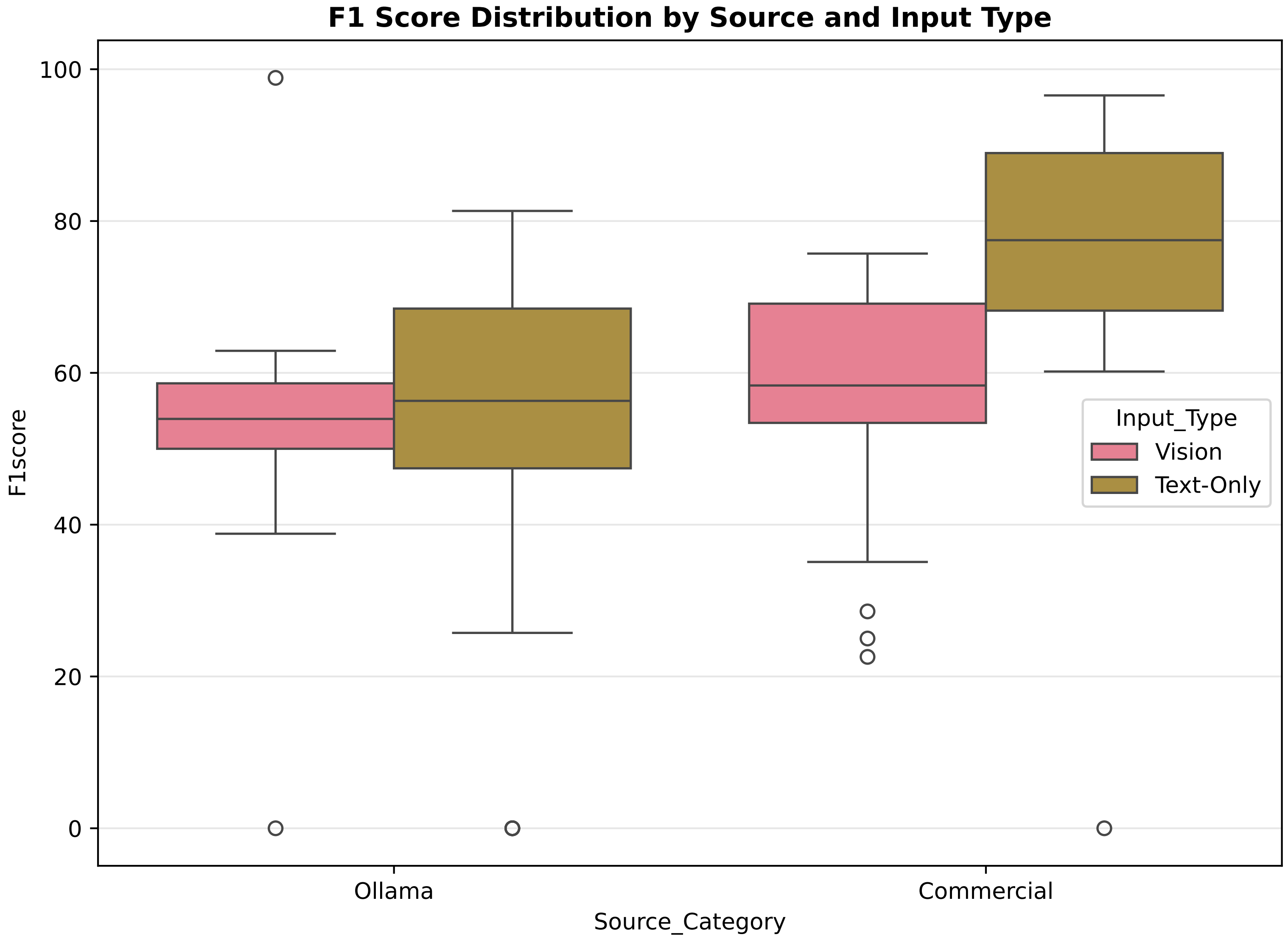

Average F1 Score: Family vs Input Type
Family
GPT
Gemma/Gemini
Granite
Llama
Mistral
Qwen
68.18
56.49
65.39
55.38
49.13
46.47
58.41
82.95
61.76
54.19
Text-Only
Vision
Input_Type
80
75
70
65
60
55
50
Average Accuracy: Family vs Hospital
Family
GPT
Gemma/Gemini
Granite
Llama
Mistral
Qwen
52.65
44.93
49.66
57.06
28.34
44.45
52.50
41.42
71.15
88.64
48.50
50.04
hospital1
hospital2
Hospital
80
70
60
50
40
30


False Positives vs False Negatives by Family and Input Type
False Negatives
False Positives
0
20
40
60
80
Family
Qwen
Gemma/Gemini
Granite
Llama
GPT
Mistral
Input_Type
Vision
Text-Only
Equal Errors Line
Error Distribution by Model Family
Error_Count
Error_Type
False Positives
False Negatives
Qwen
Gemma/Gemini
Granite
Llama
GPT
Mistral
Family
Error Ratio vs Total Errors
(Ratio = FP/FN)
False Positive / False Negative Ratio
Total_Errors
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
0
25
50
75
100
125
150
175
Equal FP/FN
Error Bias: FP - FN by Family and Hospital
(+ve = More FP, -ve = More FN)
Family
Hospital
GPT
Gemma/Gemini
Granite
Llama
Mistral
Qwen
hospital1
hospital2
-14.9
-23.4
-2.3
-10.7
-5.7
-28.1
-12.2
-13.6
7.0
-1.0
-2.6
-10.5
5
0
−5
−10
−15
−20
−25


F1 Score Distribution by Hospital and Family
F1score
100
80
60
40
20
0
hospital1
hospital2
Hospital
Family
Qwen
Gemma/Gemini
Granite
Llama
GPT
Mistral
Accuracy Distribution by Hospital and Input Type
Accuracy
100
80
60
40
20
0
hospital1
hospital2
Hospital
Input_Type
Vision
Text-Only



Average Performance Metrics by Source Category



F1 Score Distribution by Source and Input Type