

Results

```
... Loading models... This may take a few minutes on first run.
=====
IMPROVED HOSTEL CONFLICT DETECTION PIPELINE
=====

[STEP 1] Generating enhanced hostel requirements dataset...
Generated 300 requirements
- Budget conflicts: 75
- Space conflicts: 87
- Compliance conflicts: 121
- Security conflicts: 121

[STEP 2] Generating sentence embeddings...

📦 Loading sentence-transformers/all-MiniLM-L6-v2 model...
This may take 1-2 minutes on first run (downloading ~90MB)...
tokenizer_config.json: 100% ██████████ 350/350 [00:00<00:00, 32.4kB/s]
vocab.txt: █████ 232k/? [00:00<00:00, 10.3MB/s]
tokenizer.json: █████ 466k/? [00:00<00:00, 28.6MB/s]
special_tokens_map.json: 100% ██████████ 112/112 [00:00<00:00, 10.7kB/s]
config.json: 100% ██████████ 612/612 [00:00<00:00, 74.0kB/s]
model.safetensors: 100% ██████████ 90.9M/90.9M [00:00<00:00, 159MB/s]
Model loaded successfully on cuda
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Embedding Generation

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... Generating embeddings for 300 requirements...
  Processed 80/300 requirements...
  Processed 160/300 requirements...
  Processed 240/300 requirements...
  Embeddings generated: shape (300, 384)

[STEP 3] Creating hybrid features...

Creating hybrid features (Embeddings + TF-IDF)...
Hybrid features created: shape (300, 584)
- Embedding features: 384
- TF-IDF features: 200

[STEP 4] Training enhanced conflict detection model...

Dataset split:
  Training samples: 225
  Test samples: 75

Training XGBoost classifiers (Binary Relevance)...
Training completed!
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MODEL PERFORMANCE METRICS

Hamming Loss: 0.1433
TARGET ACHIEVED: < 0.15
Subset Accuracy (Exact Match): 0.5600

Classification Report:

	precision	recall	f1-score	support
Budget	0.86	0.63	0.73	19
Space	0.78	0.67	0.72	21
Compliance	0.80	0.65	0.71	31
Security	0.87	0.90	0.88	29
micro avg	0.83	0.72	0.77	100
macro avg	0.83	0.71	0.76	100
weighted avg	0.83	0.72	0.77	100
samples avg	0.75	0.73	0.72	100

Per-Label Performance Analysis:

Budget : Accuracy = 0.8800
Space : Accuracy = 0.8533
Compliance : Accuracy = 0.7867
Security : Accuracy = 0.9067

[STEP 5] Running predictions on all requirements...

Predicting conflicts for 300 requirements...
Conflict prediction completed!

Conflict Summary:

High Severity (3+ conflicts): 5 requirements
Medium Severity (2 conflicts): 90 requirements
Low Severity (1 conflict): 196 requirements
No Conflicts: 9 requirements

Conflict Summary

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● HIGH SEVERITY CONFLICTS:

*** REQ-014: Store all data on local USB drives...
Conflicts: Budget, Compliance, Security

REQ-020: No encryption to save processing costs...
Conflicts: Budget, Compliance, Security

REQ-032: Store backups on employee personal devices...
Conflicts: Budget, Compliance, Security

REQ-038: Use deprecated software to avoid license costs...
Conflicts: Budget, Compliance, Security

REQ-042: Store credit card data in plain text files...
Conflicts: Budget, Compliance, Security

MEDIUM SEVERITY CONFLICTS:

REQ-001: System must support premium features with enterprise-grade security...
Conflicts: Budget, Security

REQ-004: Use free open-source database for all operations...
Conflicts: Budget, Security

REQ-005: Require biometric authentication for all access points...
Conflicts: Budget, Security

REQ-008: Implement AI-powered predictive maintenance system...
Conflicts: Budget, Space

REQ-009: Use consumer-grade hardware for critical systems...
Conflicts: Budget, Security

Resolution

Selected 25 top conflicts for resolution generation

Generating resolutions using Mistral AI...

Processing 25 conflicts...

Generated 5/25 resolutions...

Generated 20/25 resolutions...

Generated 25/25 resolutions...

All resolutions generated!

Example

...

REQ-001 Severity: Medium Conflicts: 2
<div><div></div><div>REQUIREMENT: System must support premium features with enterprise-grade security</div></div>
<div><div></div><div>CONFLICTS DETECTED: Budget, Security</div></div>
<div><div>RECOMMENDED RESOLUTION:</div><div><div>**Resolution:**</div><div>To balance budget constraints with enterprise-grade security, prioritize premium features that directly impact core hostel operations.</div></div></div>

REQ-004 Severity: Medium Conflicts: 2
<div><div></div><div>REQUIREMENT: Use free open-source database for all operations</div></div>
<div><div></div><div>CONFLICTS DETECTED: Budget, Security</div></div>
<div><div>RECOMMENDED RESOLUTION:</div><div><div>**Resolution:**</div><div>While open-source databases like PostgreSQL or MySQL can meet most operational needs cost-effectively, consider</div></div></div>

Main Objective

Hamming Loss: 0.1433

Subset Accuracy: 0.5600

Test Samples: 75

TARGET ACHIEVED! Hamming Loss < 0.15