

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
```

Embedding Generation

```
... 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!
```

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

■ REQUIREMENT:

System must support premium features with enterprise-grade security

⚠ CONFLICTS DETECTED:

Budget, Security

RECOMMENDED RESOLUTION:

Resolution:

To balance budget constraints with enterprise-grade security, prioritize premium features that directly impact core hostel opera

REQ-004 | Severity: Medium | Conflicts: 2

■ REQUIREMENT:

Use free open-source database for all operations

⚠ CONFLICTS DETECTED:

Budget, Security

RECOMMENDED RESOLUTION:

Resolution: While open-source databases like PostgreSQL or MySQL can meet most operational needs cost-effectively, consider

Main Objective

✓ Hamming Loss: 0.1433

Subset Accuracy: 0.5600

Test Samples: 75

TARGET ACHIEVED! Hamming Loss < 0.15