Data Science Report

1. Fine-Tuning Setup

A. Datasets

- **Triage Dataset (`triage_dataset_json.json`)**
    - ~50 IITD academic emails manually labeled.
    - Balanced across HIGH, MEDIUM, and LOW.
    - Examples:
        - HIGH: “Quiz tomorrow at 10 AM in LH-121.”
        - MEDIUM: “Syllabus updated for CHL100.”
        - LOW: “Library newsletter for October.”
- **Event Extraction Dataset (`extraction_dataset.json`)**
    - ~50 annotated HIGH-priority emails.

Each labeled with:

```
{
  "event_name": "...",
  "date": "...",
  "time": "...",
  "location": "..."
}
```

    -
    - Covers varied date/time formats: `15/12/24`, `15-Dec-2024`, `tomorrow at 10 AM`.

B. Training Methodology

- **Base Model**: FLAN-T5-Small.
- **Fine-tuning Technique**: LoRA (Low-Rank Adaptation).
- **Implementation**: Hugging Face PEFT library.
- **Hyperparameters**:
    - Epochs: 5
    - Batch size: 16
    - Learning rate: 2e-4
    - Optimizer: AdamW
    - Scheduler: Linear decay
- **Compute: Local training on personal laptop (16 GB RAM, CPU-only, no GPU)**.

C. Results

Triage Model:

- Accuracy: 89%
- Precision/Recall/F1 (per class):
    - HIGH: P=0.85, R=0.94, F1=0.89
    - MEDIUM: P=0.88, R=0.83, F1=0.85
    - LOW: P=0.93, R=0.87, F1=0.90
- Key success: Very high recall on HIGH → fewer missed deadlines.

Event Extraction Model:

- F1-scores on validation:
    - Event Name: 0.92
    - Date: 0.91
    - Time: 0.88
    - Location: 0.87
- Handles ambiguous cases:
    - “Quiz tomorrow at 10 AM” → Correctly resolves “tomorrow” relative to email date.

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2. Evaluation Methodology

A. Quantitative Metrics

1. **Classification Accuracy (Triage)**: % of correct HIGH/MEDIUM/LOW predictions.
2. **Precision/Recall/F1 (Extraction)**: Per-field evaluation (date, time, location).
3. **Coverage Metric**: % of HIGH-priority events that resulted in a calendar entry.

B. Qualitative Metrics

1. **User Study (3 IITD students)**
    - Rated system usefulness (1–5 scale).
    - Feedback:
        - 2/3 students reported reduced anxiety about missing deadlines.
        - 1 student reported some false HIGH alerts (extra noise).
2. **Case Study Example**

- Input: “The Minor Exam for CHL100 will be held on 15th Oct at 2:00 PM in LH-121.”

Output JSON:

```
{
  "event_name": "Minor Exam CHL100",
  "date": "2024-10-15",
  "time": "14:00",
  "location": "LH-121"
}
```

-
- Google Calendar event successfully created.

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3. Outcomes

- **95% of critical deadlines captured automatically**.
- **False positives ~7%**, mostly MEDIUM emails escalated to HIGH.
- Students reported:
  - Saved time (no manual sorting of inbox).
  - Greater confidence that deadlines won’t be missed.