

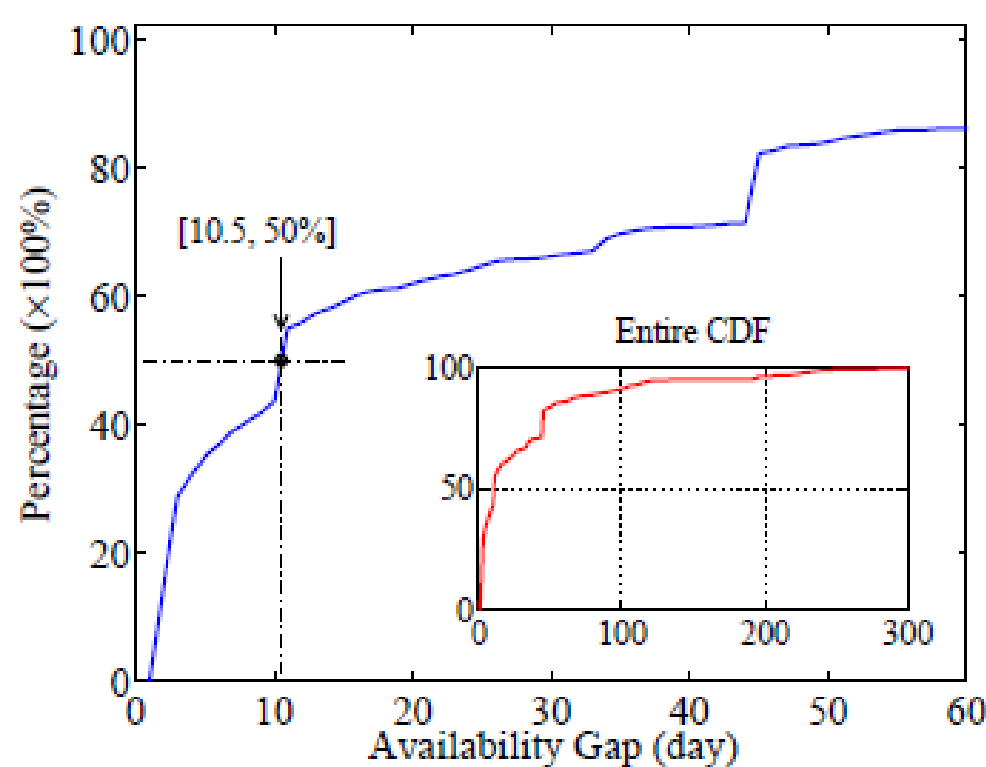
# MediaScope: Selective On-Demand Media Retrieval from Mobile Devices

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## Introduction

### Media Retrieval from Mobile Devices



- **Capability of Mobile Devices**
  - Capturing tons of good media objects
- **Wireless Bandwidth is Scarce**
  - Cannot upload everything immediately
- **→ Availability Gap!**
  - We are viewing images of 10 days old!
- **How to bridge Availability Gap?**
  - On-demand media retrieval

### Requirements and Challenges

- **Retrieval Accuracy**
  - Features of media files
    - Accurate on semantic meaning
    - Easy to calculate
    - Easy to upload
- **Timeliness Bound (Retrieval Deadline)**
  - Upload “best” results for query
- **Multiple Concurrent Queries**
  - Upload “good” results for each query

## Feature Space Similarity Query on Mobile Devices



1. **Extract Features from Media Files**
  - Upload (Aggregated) Features
2. **Accept Queries on Feature Space**
  - k-Nearest Neighbors
  - Spanners
  - Clusters
3. **Find Media Files to Answer Each Query**
4. **On-Demand Media Files Uploading**

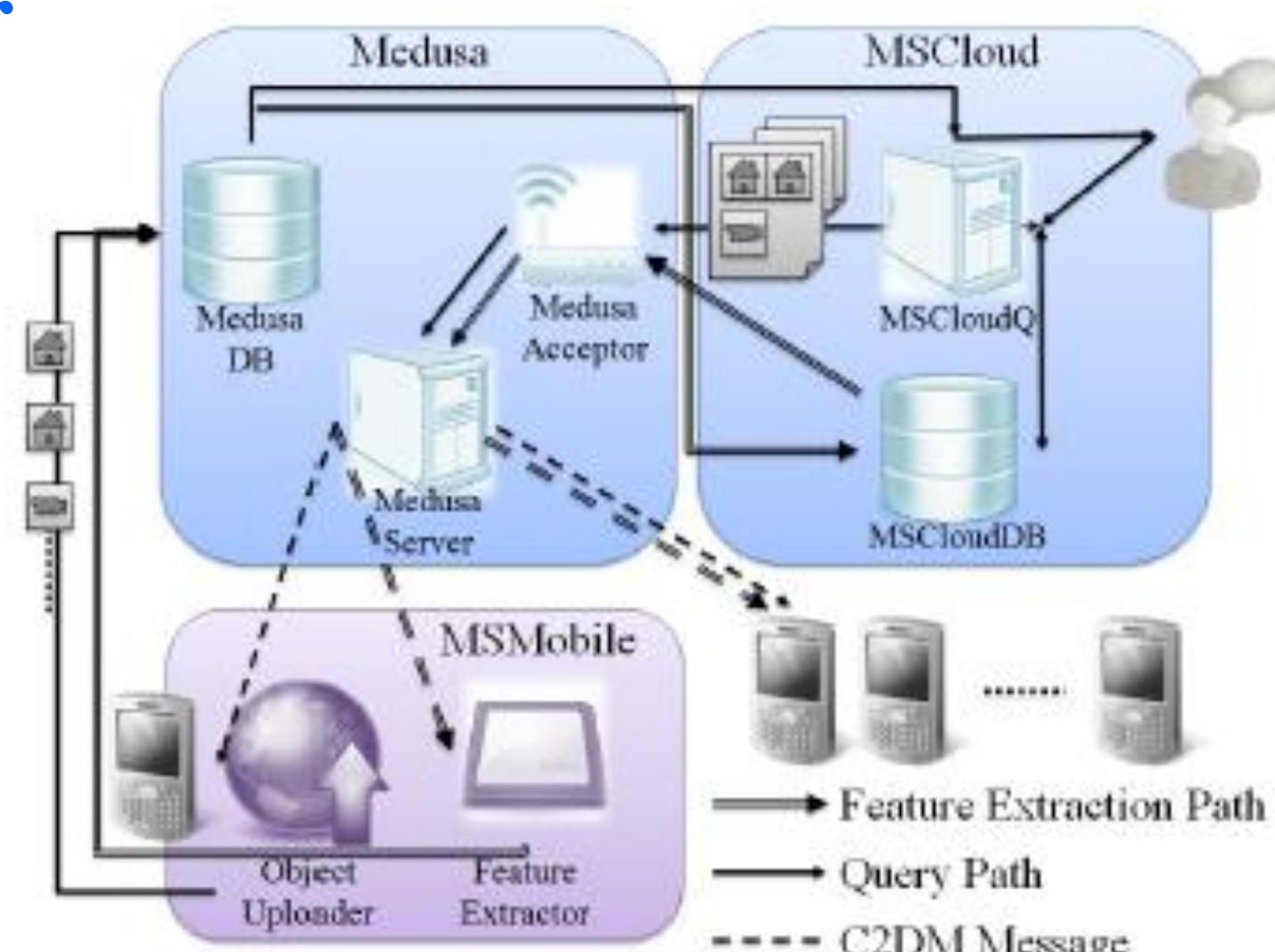
## MediaScope: Selective On-Demand Media Retrieval from Mobile Devices

### MSMobile-Feature Extractor

- **CEDD**
  - Color and Edge Directivity Descriptor

### MSMobile-Object Uploader

- **Credit-Based Scheduling**
  - Single Query Case
    - maximum credit first uploading
    - Consider credit only
  - Multiple Concurrent Queries Case
    - MediaScope Scheduling Algorithm
    - Consider credit and timeliness



### MSCloud-MSCloudQ

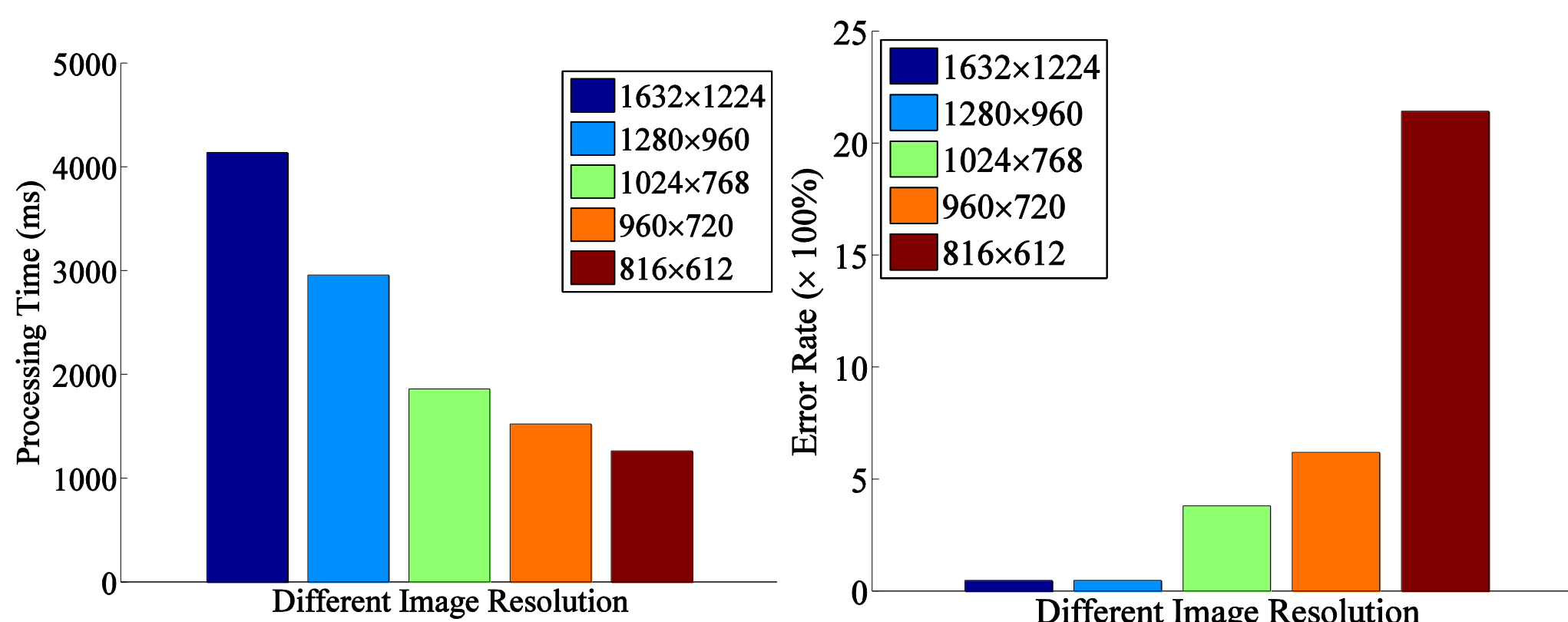
- **Credit Assignment Mechanism**
  - Assign a total credit for each query
    - proportional to its payment
  - Calculate best answers to get selected files
    - e.g., run k-NN
  - Assign each selected media file a *credit*

### MSCloud-MSCloudDB

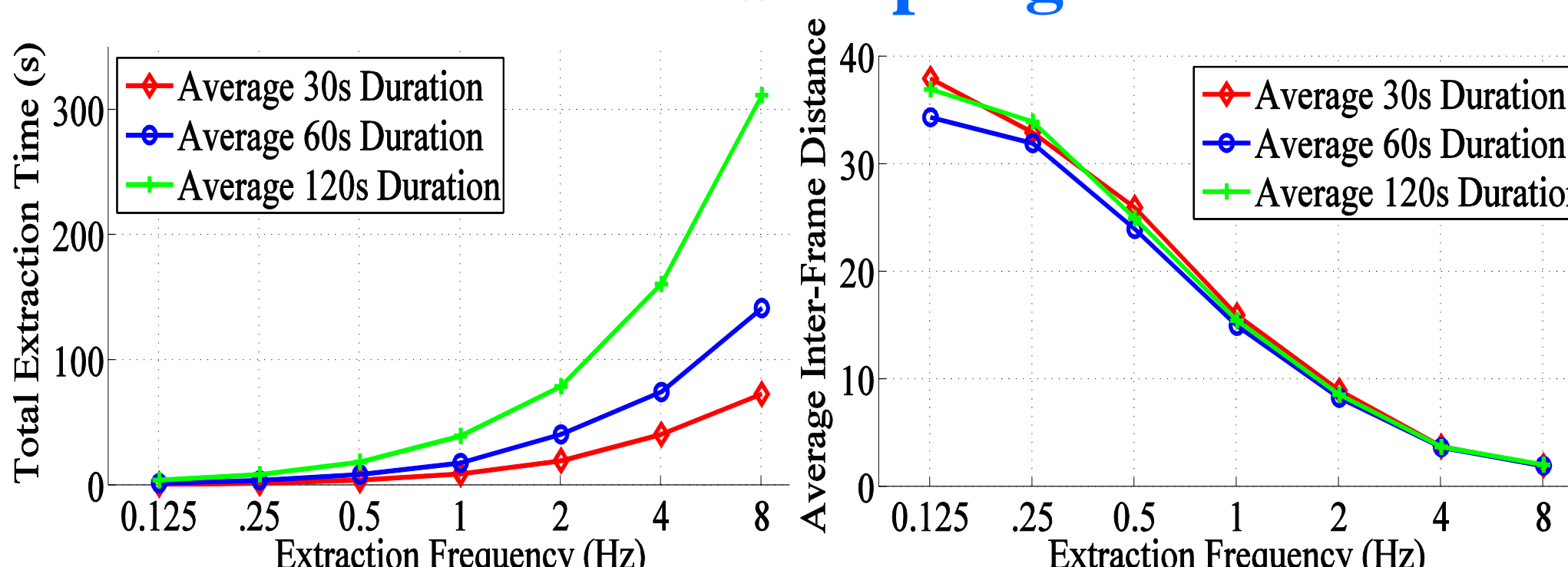
- **Indexing Collected Features**
  1. Features
  2. Mobile Device ID
  3. Media File ID

## Evaluation

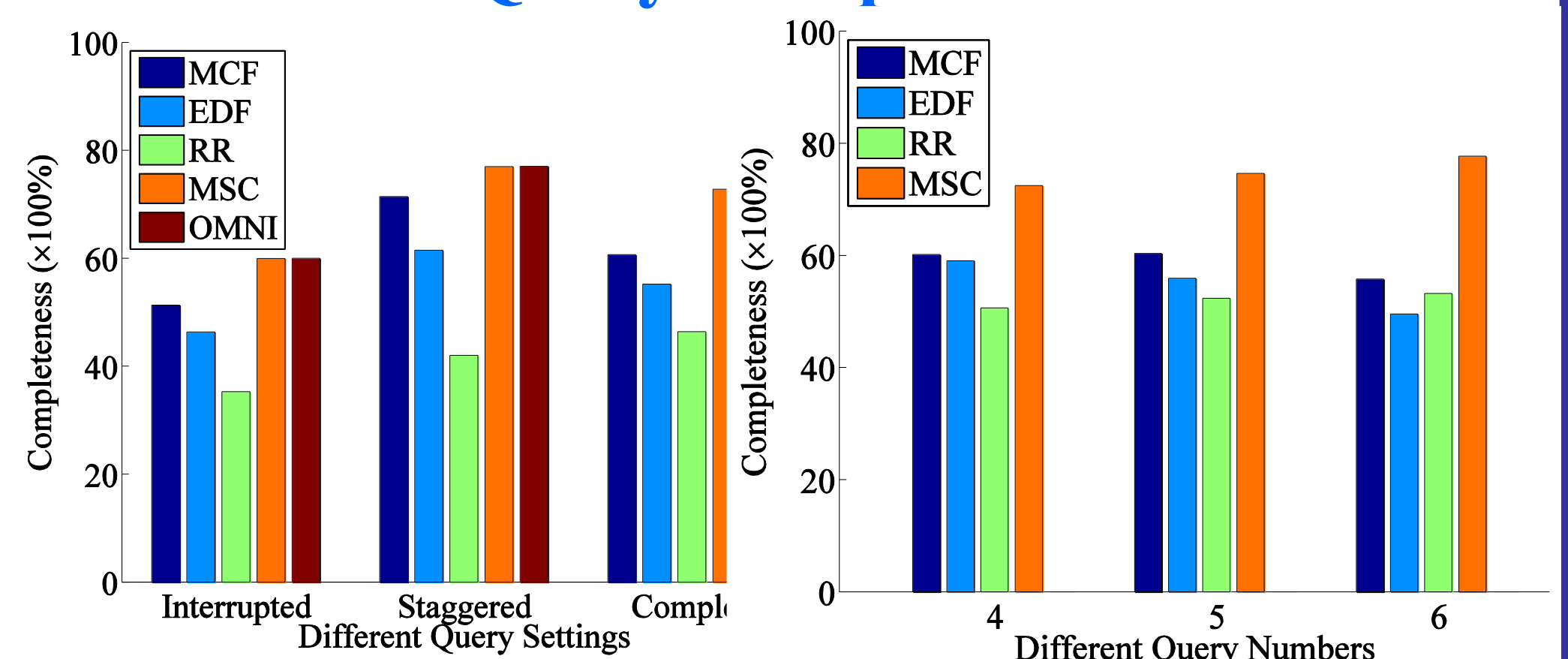
### Feature Extraction



### Video Sampling



### Query Completeness



### System Overhead

Average Latency (ms)	
MSCloud to Medusa	131
C2DM (send-to-receive)	150
Task Execution	67
Upload Scheduling	46
Medusa to MSCloud Image Transfer	67
Table 1—System Communication and App Running Overhead	
Average Latency (ms)	
Query Parsing	24
Feature Vector Download	138
Medusa Server Interpretation	68
Spanner	89
K Clusters	52
K Nearest Neighbor	11
Query Result Response	54
Table 2—System Function Components Overhead	
Q1={81.66,20.10}, d(Q1)=8	Q4={92.74}, d(Q4)=12
Q2={166}, d(Q2)=23	Q5={96.70,21.13}, d(Q5)=23
Q3={91.46,20}, d(Q3)=10	Q6={93.73,9}, d(Q6)=16