Optimized Image Collection Planning System for KOMPSAT

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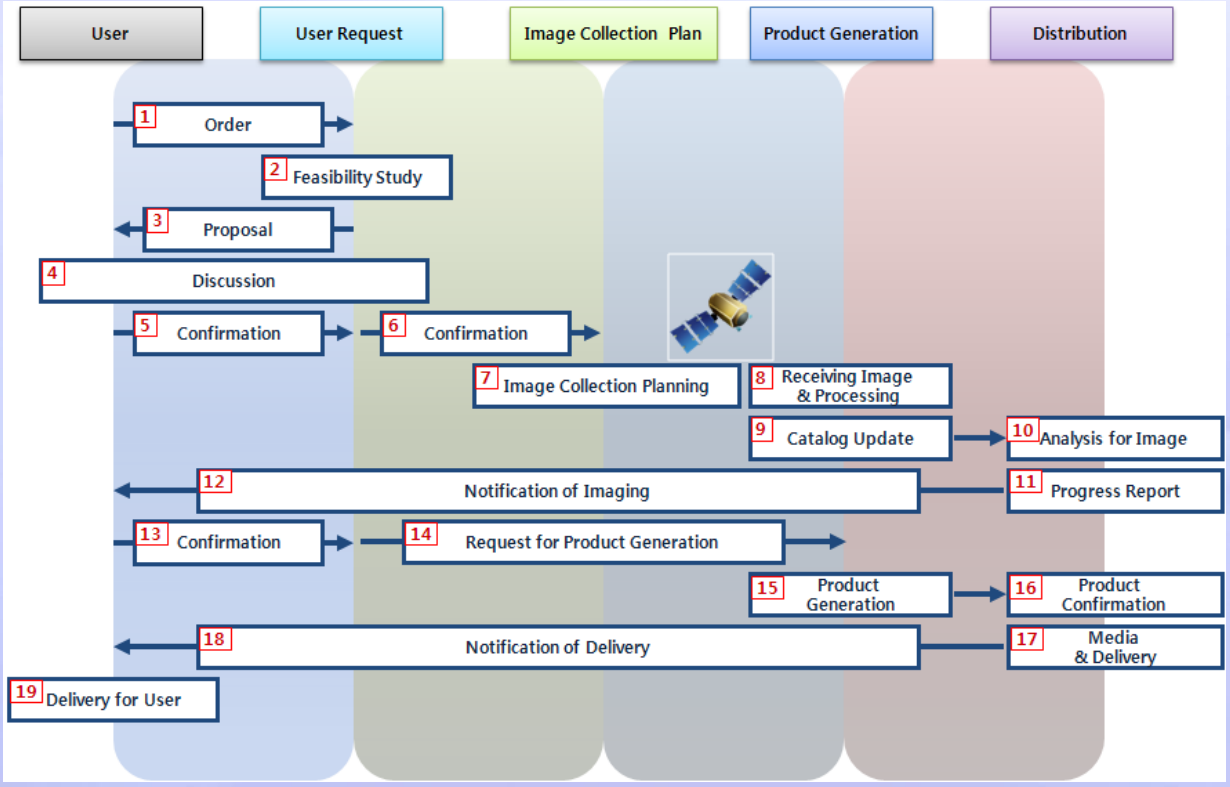
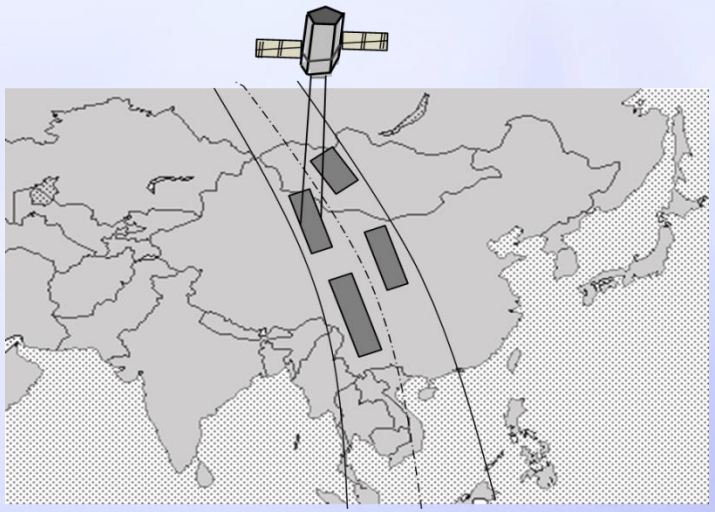
Introduction

- **Operation of satellite image**
  - ① User request
  - ② Image collection planning
  - ③ Product generation
  - ④ Distribution



Introduction

- **Image collection planning**
  - Job scheduling of satellite
  - To maximize satellite resources with NTO (New Task Order) and unfinished order from user request within several constraints
  - Many parameters are considered in image collection planning



➔ Image collection planning: complexity

  - KARI is expected to operate several satellites

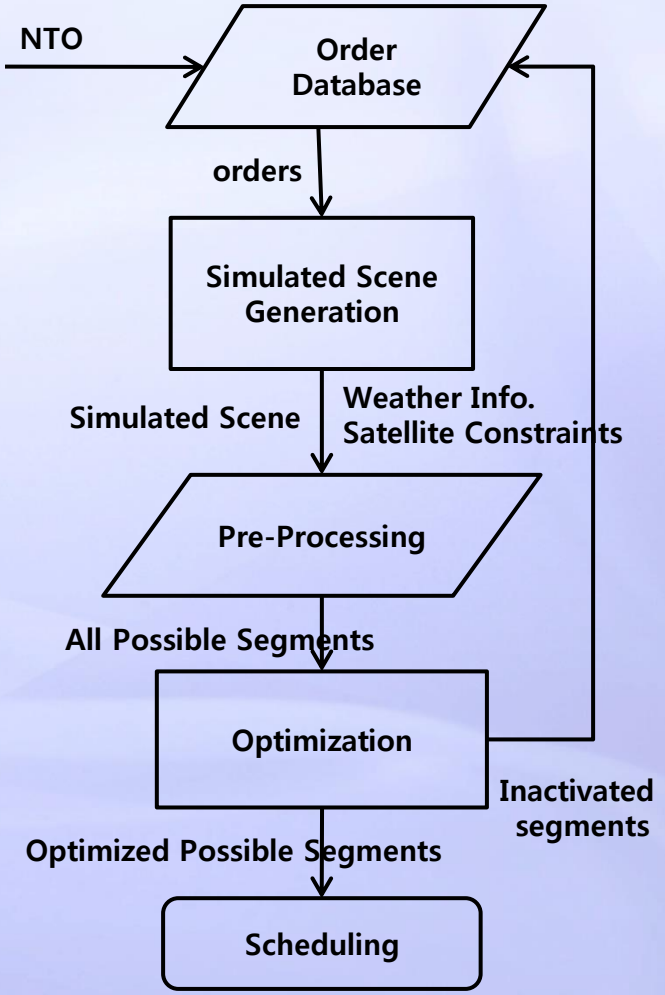
➔ Image collection planning should be optimized for multi-satellite.

  - Optimized image collection planning is already researched. But the optimized satellite planning system is able to be applied to several satellite separately (or partially) not multi-satellite operations

➔ In this paper, feasibility of efficiency improvement of optimized satellite planning system at present is investigated for image collection planning for multi-satellite.

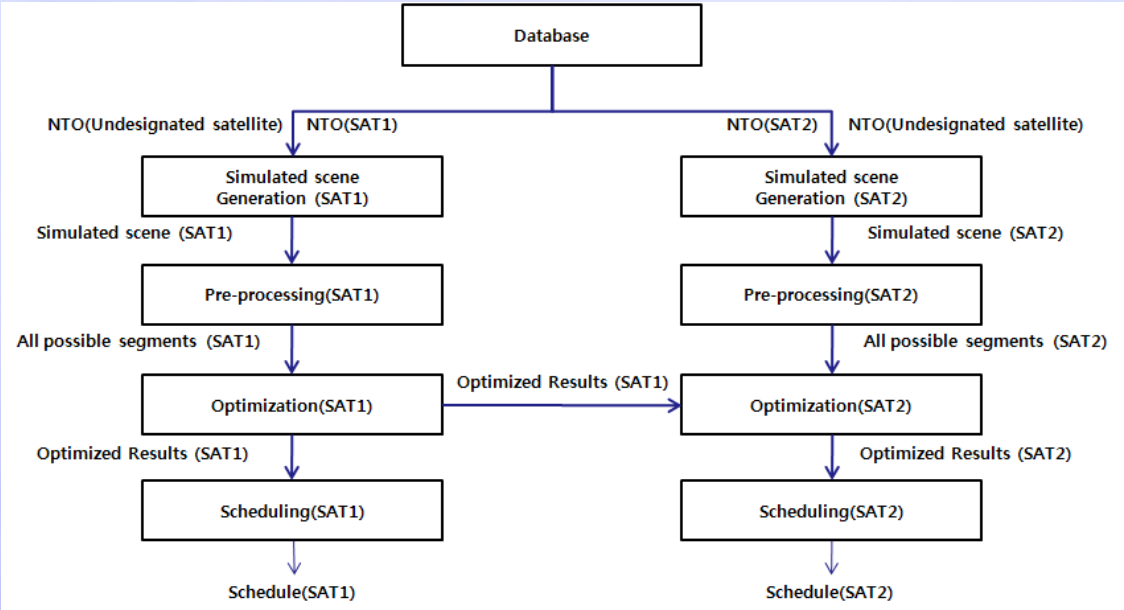
Image Collection Planning

1. NTO(New Task Order): Order Database
2. Simulated scene generation
3. Pre-Processing with simulated scene, weather Information and satellite constraints
4. Optimization with all possible segments
5. Scheduling with optimized possible segments



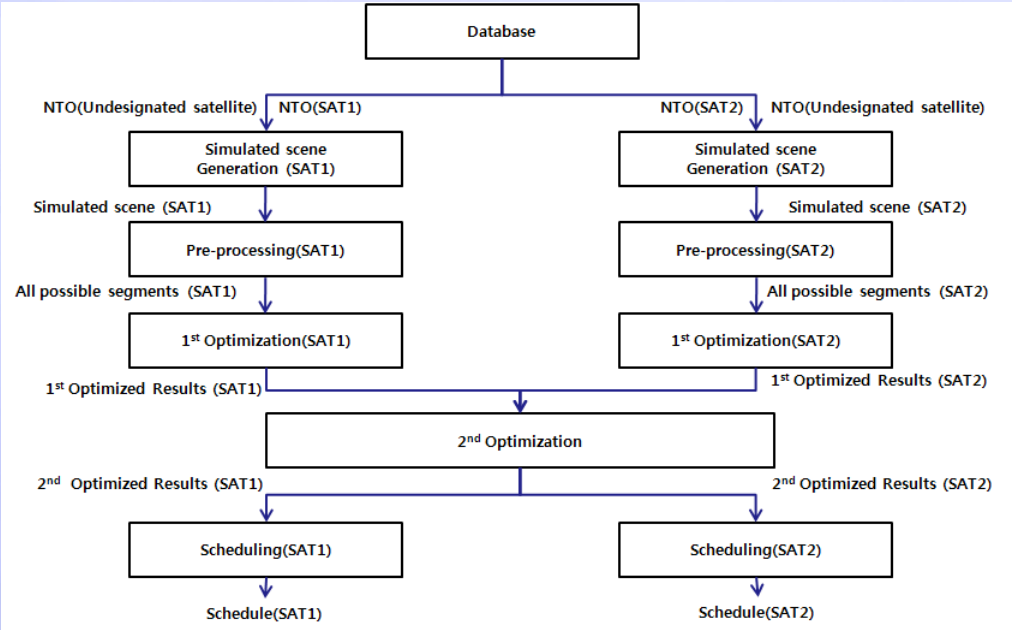
Optimized Image Collection Planning

- **Assumption: Multi-satellite operation (SAT1 & SAT2)**
- **For orders of undesignated satellite**
  - First, image collection planning for SAT1 in order with undesignated satellite and order with designated SAT1
  - Next, image collection planning for SAT2 in the result from SAT1, order with undesignated satellite and order with designated SAT2
  - But processing of optimized satellite planning system is optimized for each SAT1 and SAT2



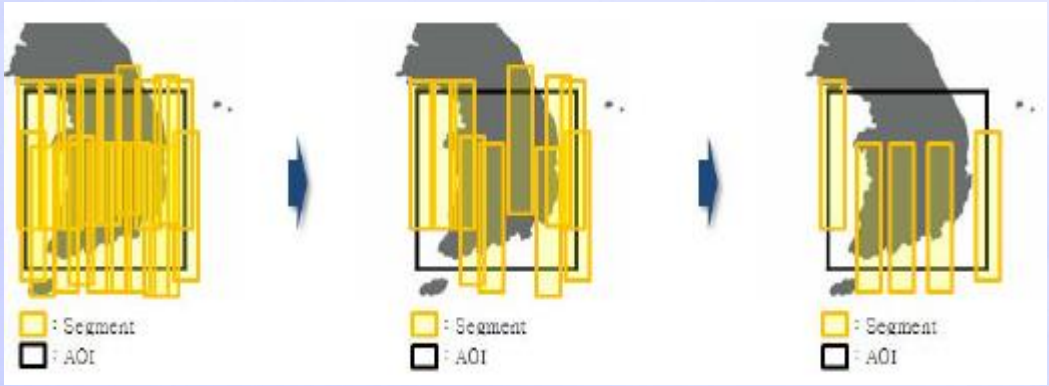
Optimized Image Collection Planning

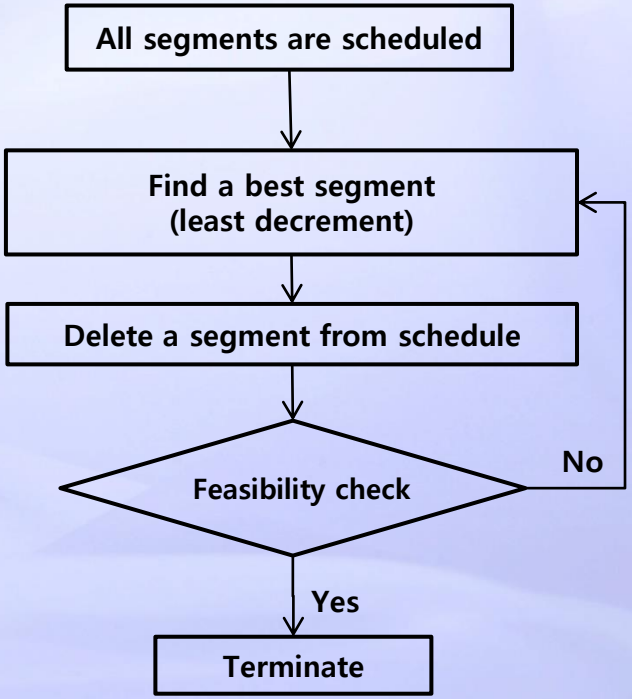
- **Assumption: Multi-satellite operation (SAT1 & SAT2)**
- **For orders of undesignated satellite**
  - First optimization: each SAT1 and SAT2
  - Second optimization
    - optimized SAT1 result and optimized SAT2 result
    - if there is collision with optimized SAT1 result and optimized SAT2 result for order with undesi gnated satellite, optimization algorithm is performed to solve the collision. And it is necessary to make simulated scene number table for order undesignated satellite to solve the collision



Optimization Algorithm Design

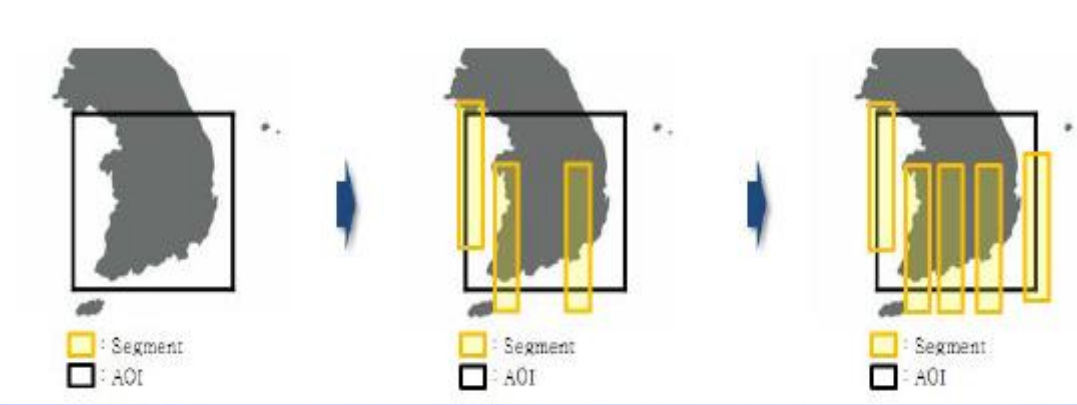
- **Heuristic Algorithm: Deletion**
  - Assumption: all segments are scheduled
  - Delete a segment from schedule until segment meets satellite constraints.

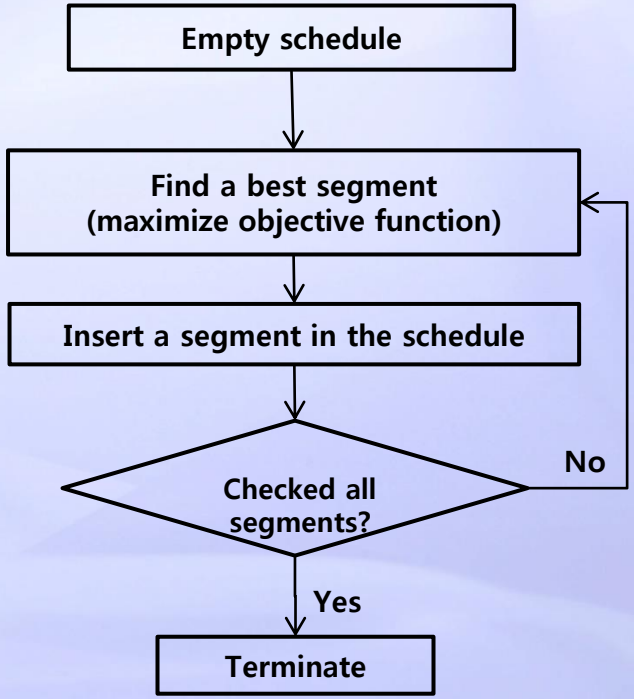




Optimization Algorithm Design

- **Heuristic Algorithm: Insertion**
  - Assumption: no segment is scheduled (empty schedule)
  - Insert a segment in the schedule until segment is added to schedule no more.





Conclusion

- **Improved design of optimized satellite planning system**
  - Two step optimization
  - Simulated scene number table

➔ **Will be expected to develop and implement system for multi-oper ation**

- **If optimized satellite planning system is used in multi-satellite op eration, it lowers human resources, computational time and can p rocess more order from user rapidly.**

Q&A

THANK YOU!!