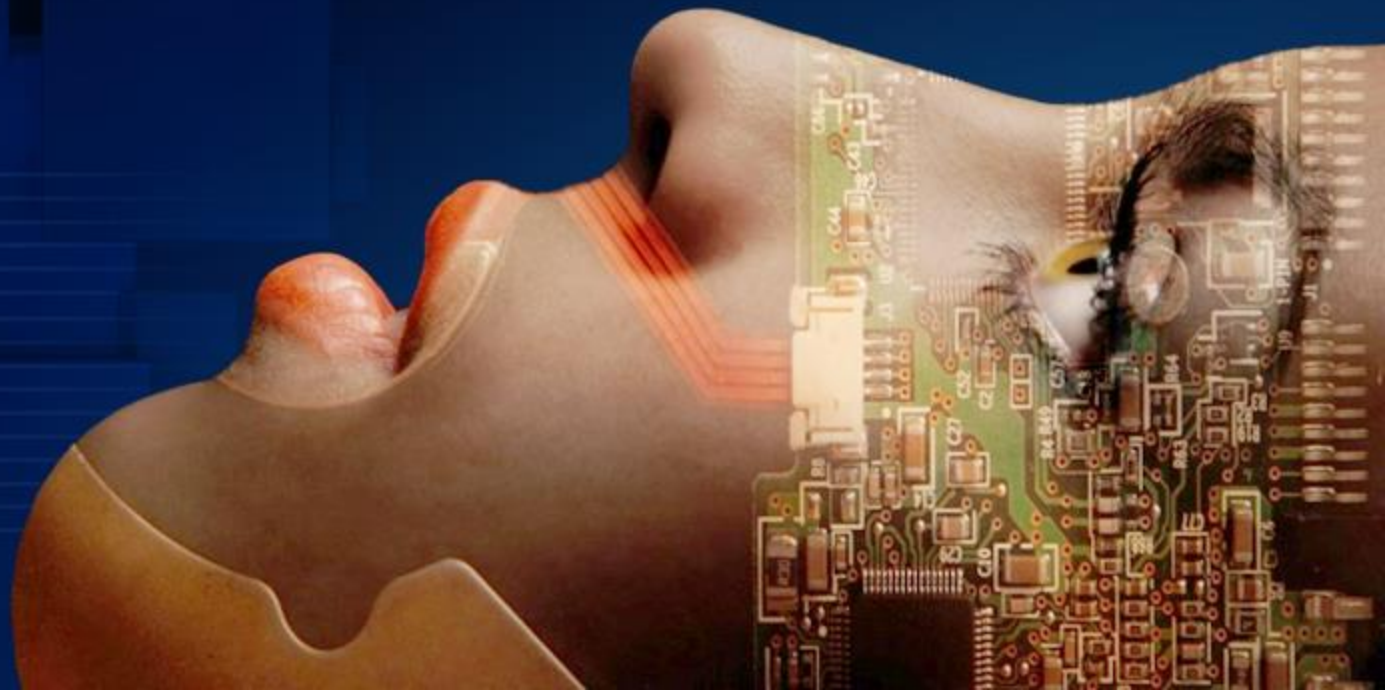
DeepView

ETRI

# Dumping Action Detection in Real World

## - Deep Learning and its Application -



Jongyoul Park

# DeepView – Visual Intelligence Platform

Human Visual Intelligence

DeepView

A man ride a skateboard in the park

Man | Skateboard | Pence | Park
Ride | People | • • • | Tree | Bus

**Visual Intelligence** — Visual Intelligence understands various objects and behaviors in the image semantically

Understanding individual Images (Visual Intelligence SW)

**1. Context Understanding**

- Object Understanding
- Action Understanding

**Visual Taxonomy** 시각 텍사노미

**Visual Data Bank** 데이터 뱅크

Large Scale Machine learning (Visual Big-Data Platform)

**2. Systematization**

- Algorithm Pipeline
- Parallel & Distributed Computing

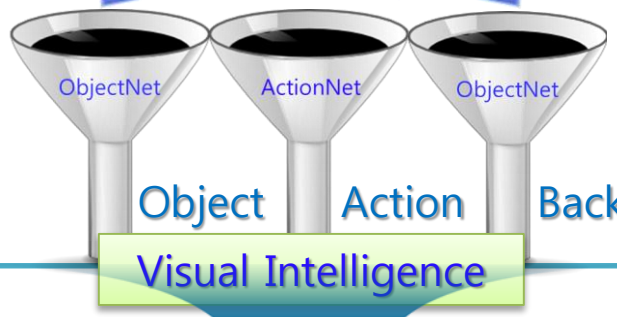
# Visual Intelligence - Step

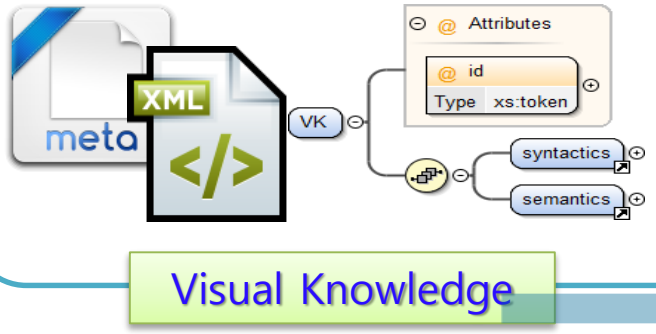
Unstructured Image/Video Data

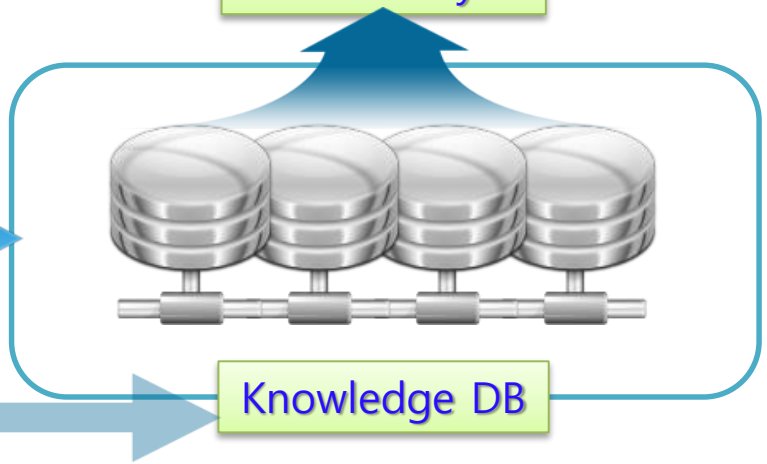
Application

Context based Search

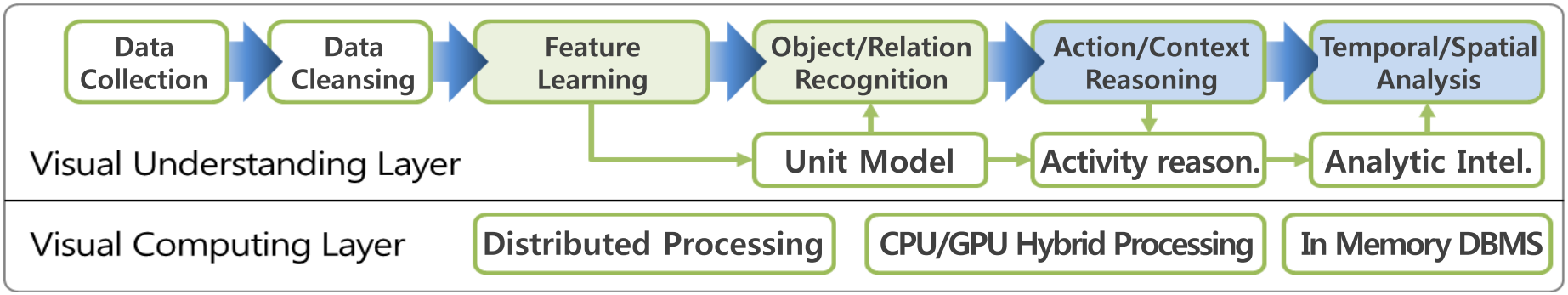
CCTV Control Center

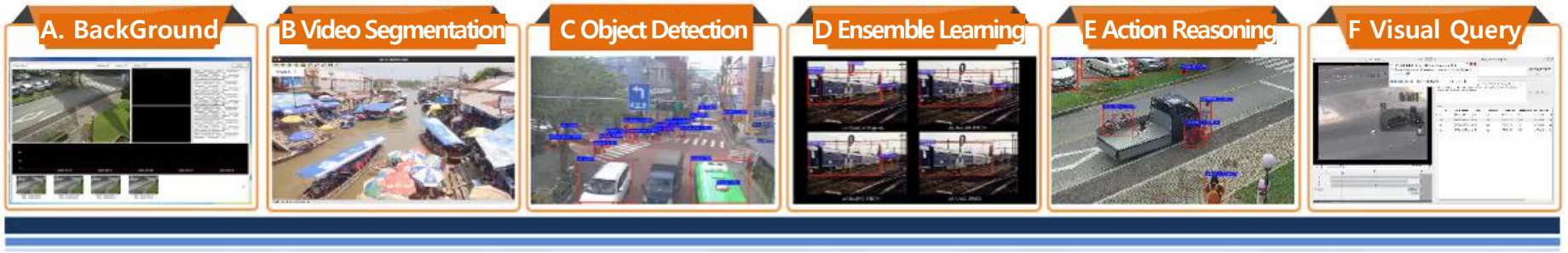




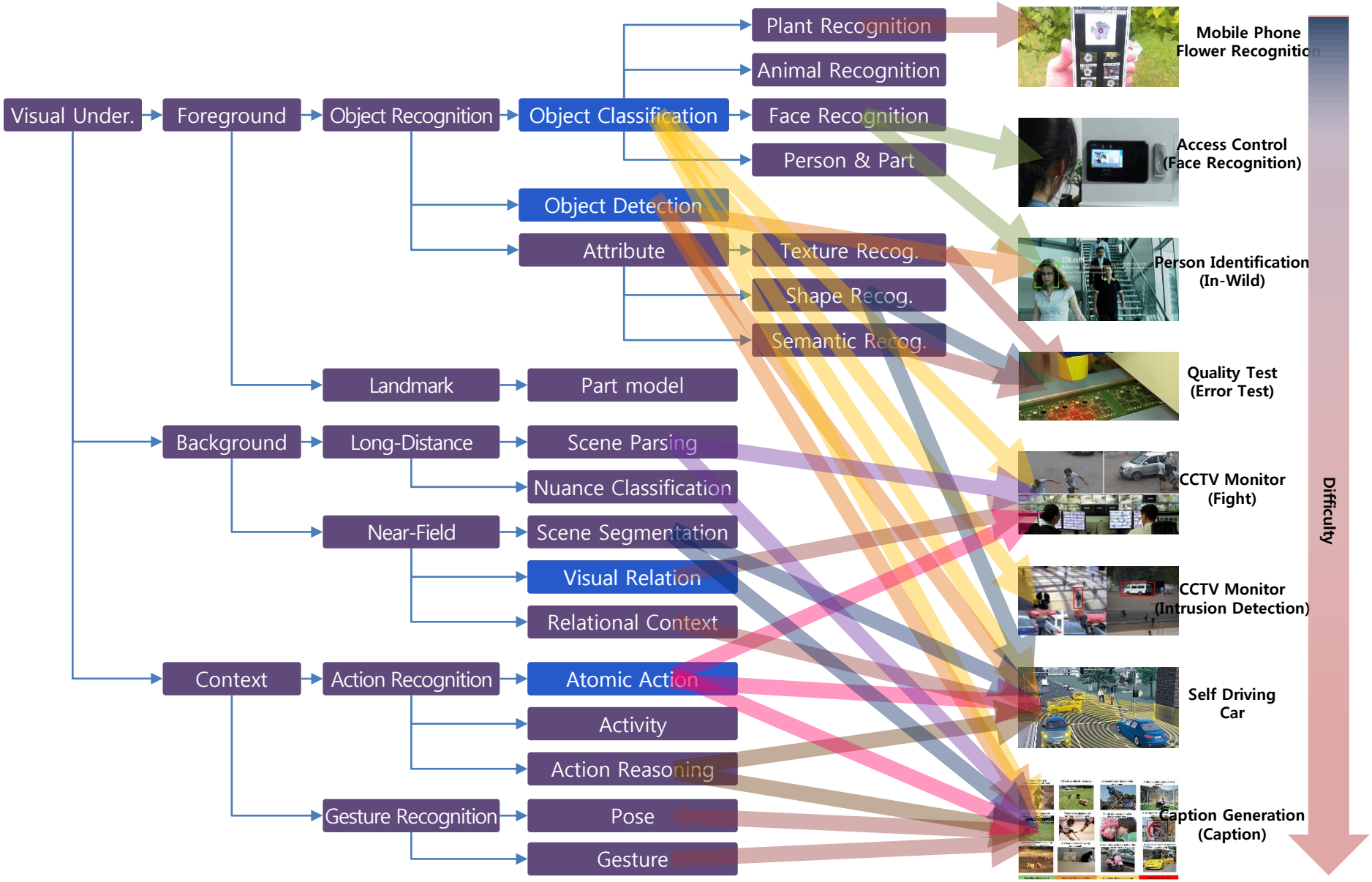



# Visual Intelligence Platform



# Visual Intelligence & Dumping Action



# Trash Heap in City

Trash Heap is City's major problem in an alley entrance

Intelligent CCTV solution not working

Everyone did not care the warning message
Because it is **not recognition me and my action**

# Dumping Action Detection

## Challenges

The behavior is inconsistent

Ex. Dumping, put down, Invisible action

Garbage has various shape

Ex. Box, Plastic Bag, Styrofoam

Too small, bag

Camera angle

## Approach

Moving Area Detect

Person Tracking

Garbage Detection

Relational Reasoning

# Comparison the detection

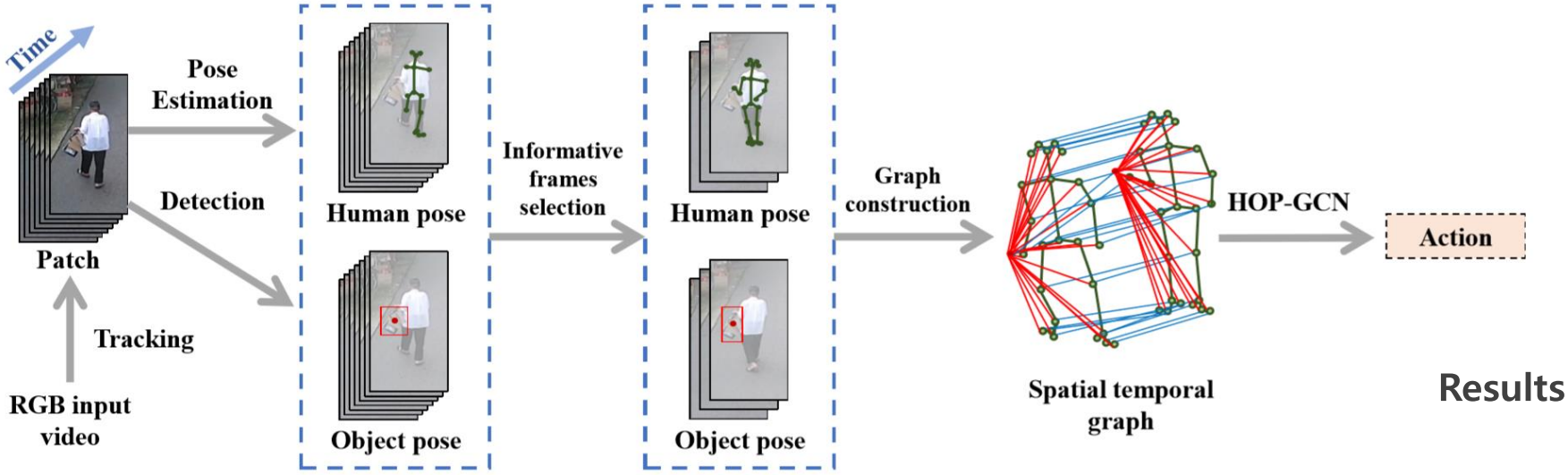
## General Detector

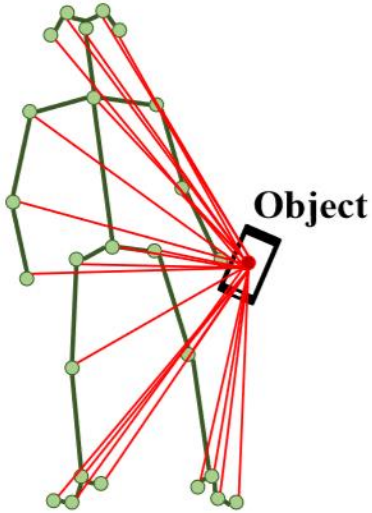
Traditional Object Detector is not working
Results of Faster R-CNN using MS COCO

## Our Detector

Human related Object Pose based Detector
Results of our simple object detector

# Pose and Action Recognition



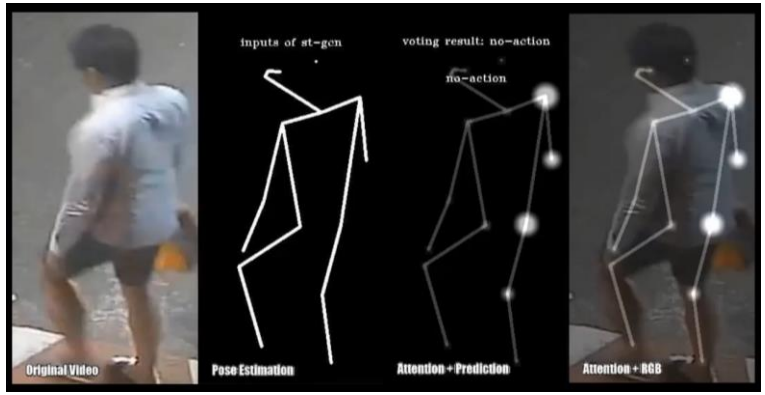

Object Pose

Comparisons with the state-of-the-art and baseline methods on the illegal dumping dataset

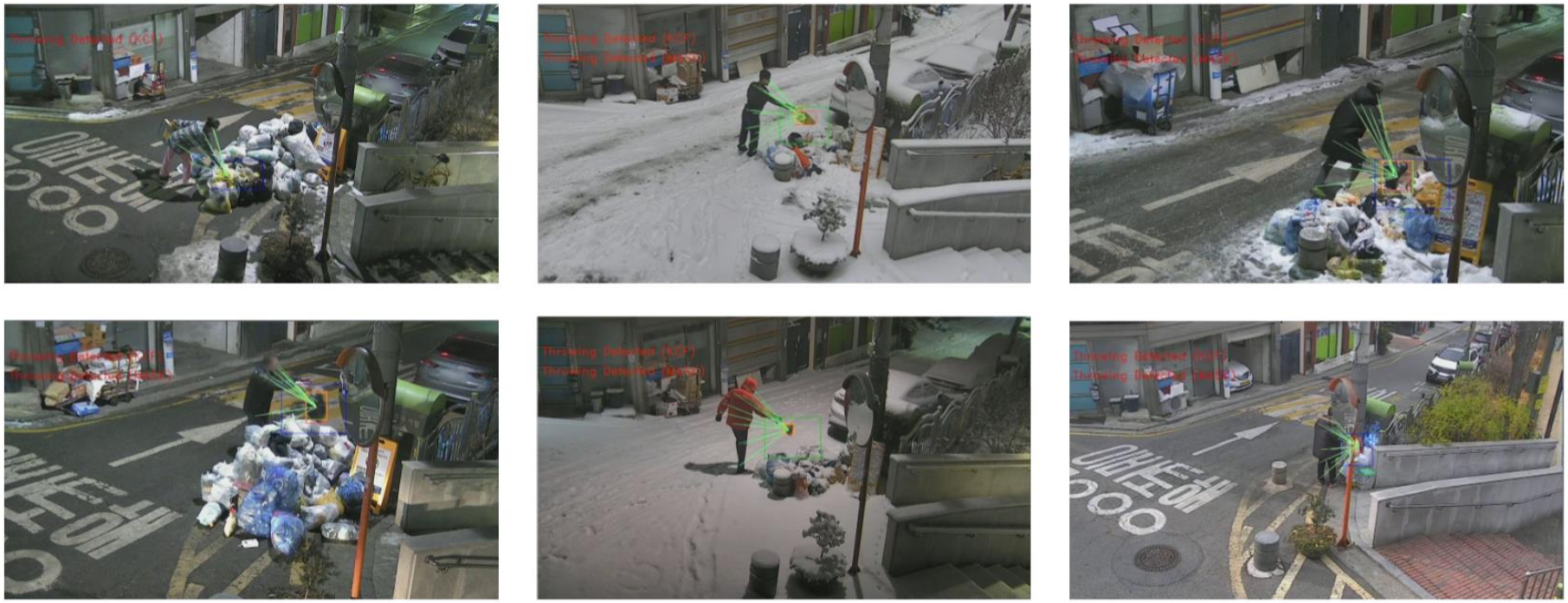
| Method | Acc.(%) |
|---|---|
| ST-GCN [33] | 83.43 |
| HOP-GCN (ours) | 86.74 |

Comparisons with the state-of-the-art and baseline methods on the ICVL dataset

| Method | Acc.(%) |
|---|---|
| ST-GCN [33] | 86.05 |
| HOPE-Net (ours) | 87.21 |



# Dumping Action Detected



Qualitative results of dumping action detection

**Normal event**
**No dumping action**

A person who does not carry an object

A person just carry an object

# Results

# Understanding Human

thanks