Project Report

In this report different experiments, their setups, and their results will be explained.

Different Graphs:

Two graph types are used. Type-1 graph is a graph which has cameras as vertexes, and the directed-edges between different vertexes as a connection between the cameras. The main disadvantage of this type of graph is that if people turn around, it cannot be shown in type-1 graph.

There is another type of graph, which is called type-3 graph. In type-3 graph, each vertex is a tuple of input/output regions of each camera and each edge means a connection between different regions. The advantage of type-3 graph is that it can show if people turn around in the middle of a path.

Different Scenarios:

Two different scenarios for cameras are defined. The first one consists of all the cameras in our dataset.

The second one consists of a part of cameras, excluding cameras 1, 2, 11, and 22. This is because a lot of people who enter the input/output region #3 of camera 2, exit from the same region of same camera. These people go to the places where there is no camera and this leads to the lack of valid information based on the input/output time and regions of each person. That being so, a new scenario consisting of a part of cameras where defined to evaluate the results better.

Subproblem:

Using this approach, the main problem will be divided into different and smaller subproblems, where solving them decreases the process time and also increases the accuracy. In each subproblem, cameras are devided into two groups, source and destination. If the number of people who go out from a source camera is equal to the number of people who enter the destination camera, these cameras and these people make a subproblem.

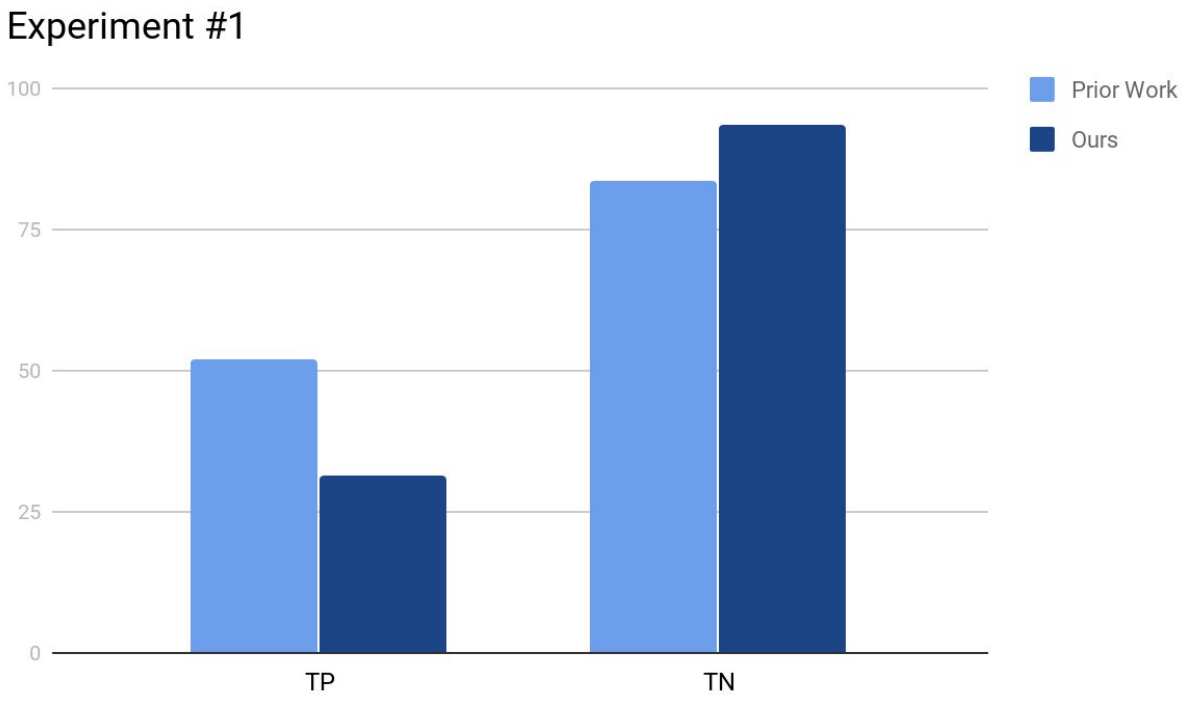
Experiments:

Experiment #1:

- Setups:
    - Type-1 Graph
    - Scenario #1
    - No subproblem

TP	Our TP	TN	Our TN
51.97	31.5	83.52	93.51

Adding more constraints would decrease true positive accuracy and increase the true negative accuracy. That is why our TP accuracy decreases and our TN accuracy increases in comparison with the prior work.



Examples:
Two correctly identified people as the same from our TP.
(left: camera #1 - right: camera #2)

Two incorrectly identified people as the same from our FP.
(left: camera #1 - right: camera #2)

Two incorrectly identified people as not the same from our FN.
(left: camera #17 - right: camera #20)

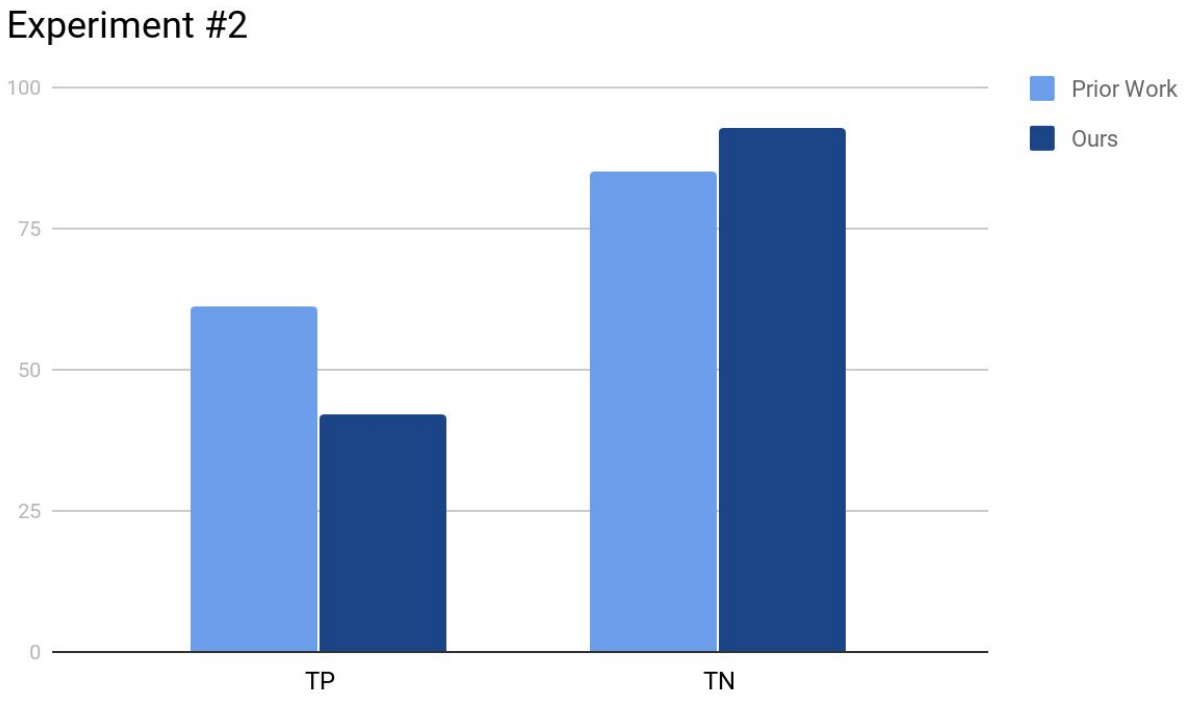
Two correctly identified people as not the same from our TN.
(left: camera #13 - right: camera #14)

Experiment #2:

- Setups:
    - Type-1 Graph
    - Scenario #2
    - No subproblem

TP	Our TP	TN	Our TN
61.36	42.05	85.12	92.98

As mentioned before, the second scenario would help to increase the TP accuracy. But since some of the correctly detected TNs were between camera #1 and camera #2, our TN accuracy decreased.

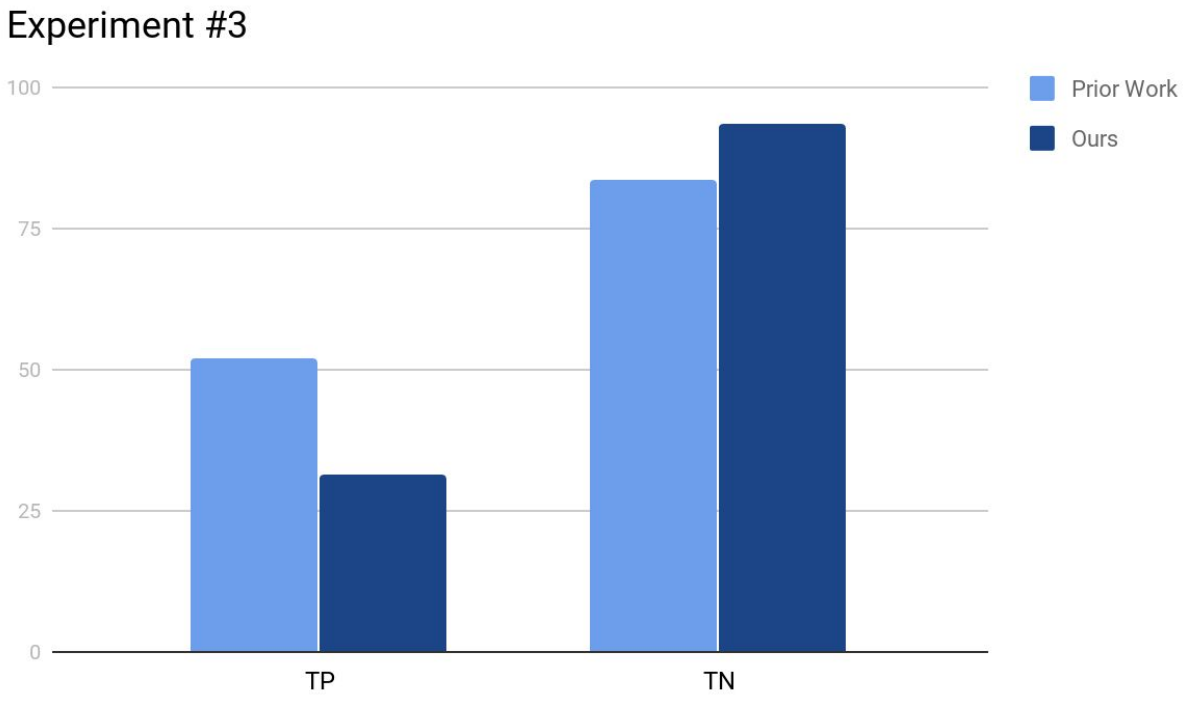


Experiment #3:

- Setups:
  - Type-3 Graph
  - Scenario #1
  - No subproblem

TP	Our TP	TN	Our TN
51.97	31.5	83.74	93.5

In this experiment, the total number of correctly identified people as not the same in our TN increased significantly, but since the number of all possible combinations decreased a lot, the ratio stays almost the same.



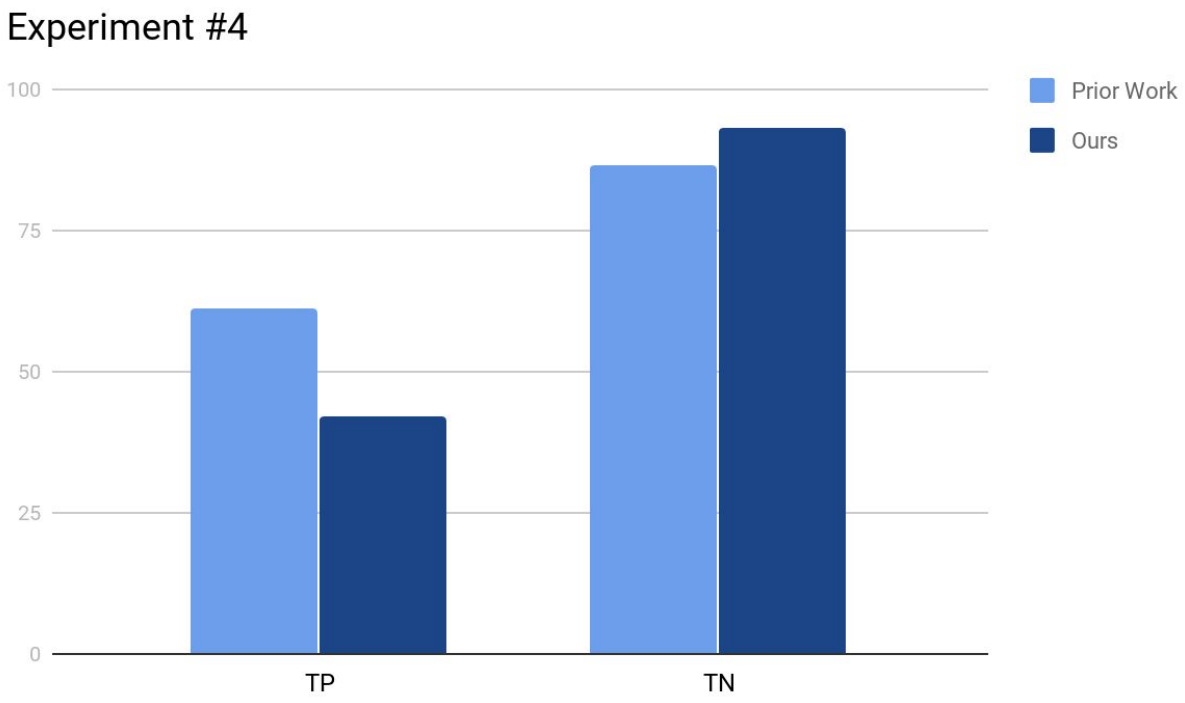
Examples:
Two correctly identified people as not the same in our TN. These two were identified incorrectly as same in experiment #1.
(left: camera #19 - right: camera #21)


Experiment #4:

- Setups:
  - Type-3 Graph
  - Scenario #2
  - No subproblem

TP	Our TP	TN	Our TN
61.36	42.05	86.55	93.28

In this experiment, we got the best results(with no subproblem).

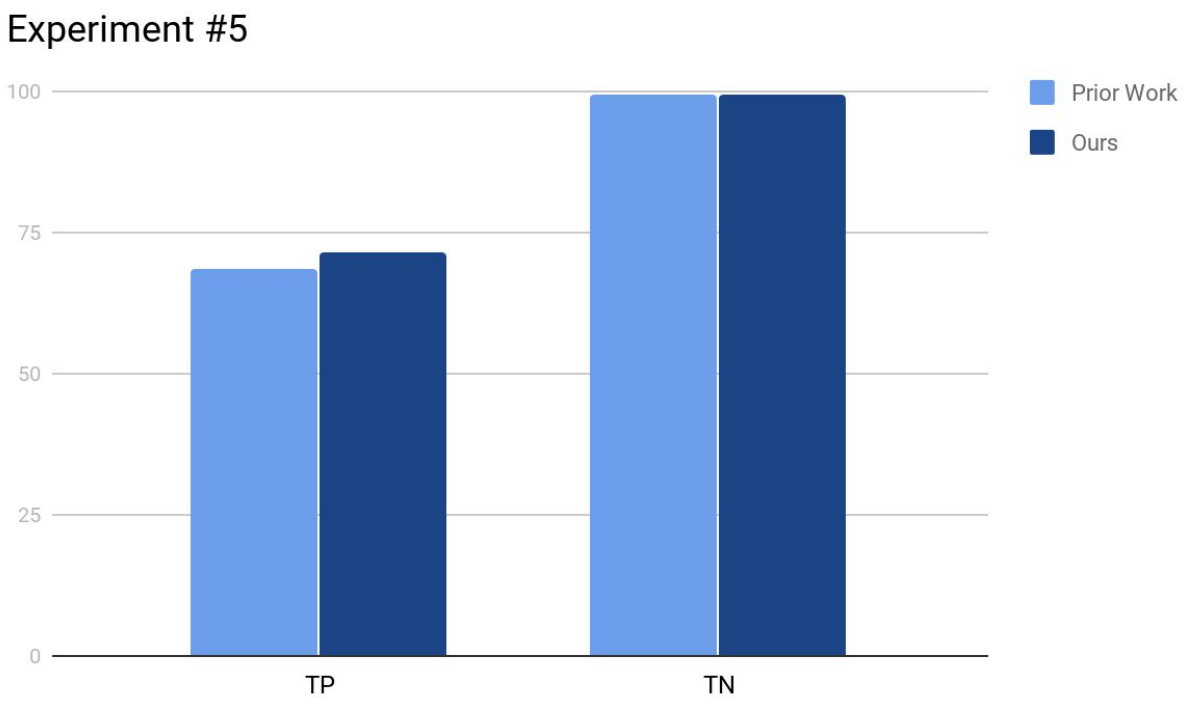


Experiment #5:

- Setups:
  - Type-1 Graph
  - Scenario #1
  - With subproblem

TP	Our TP	TN	Our TN
68.5	71.65	99.43	99.49

In the prior work, using subproblems caused to a decrease in the TP and an increase in the TN. Because by using it, non-related people were gathered together in the same subproblem that reduced TP. But in our work, subproblems increase both our TP and TN accuracy. Also, using color data increase the TN accuracy in comparison with the prior work.



Examples:
Two correctly identified people as the same from our TP who were incorrectly identified as not the same in experiment #1. This shows the power of using subproblems.
(left: camera #1 - right: camera #2)

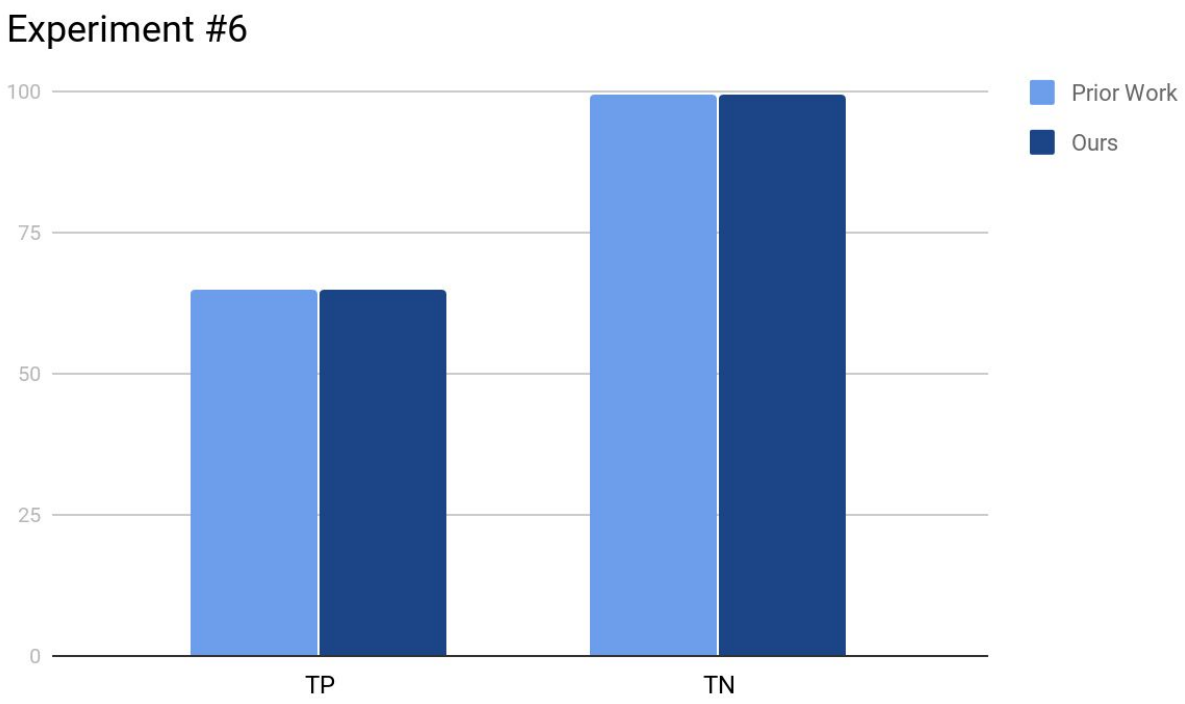
Two correctly identified people as not the same from our TN who were incorrectly identified as the same in experiment #1.
(left: camera #2 - right: camera #13)

Experiment #6:

- Setups:
  - Type-1 Graph
  - Scenario #2
  - With subproblem

TP	Our TP	TN	Our TN
64.77	64.77	99.3	99.38

Using the second scenario, some of the correctly detected data were removed. This resulted in decreasing of TP and TN, in comparison with experiment #5.

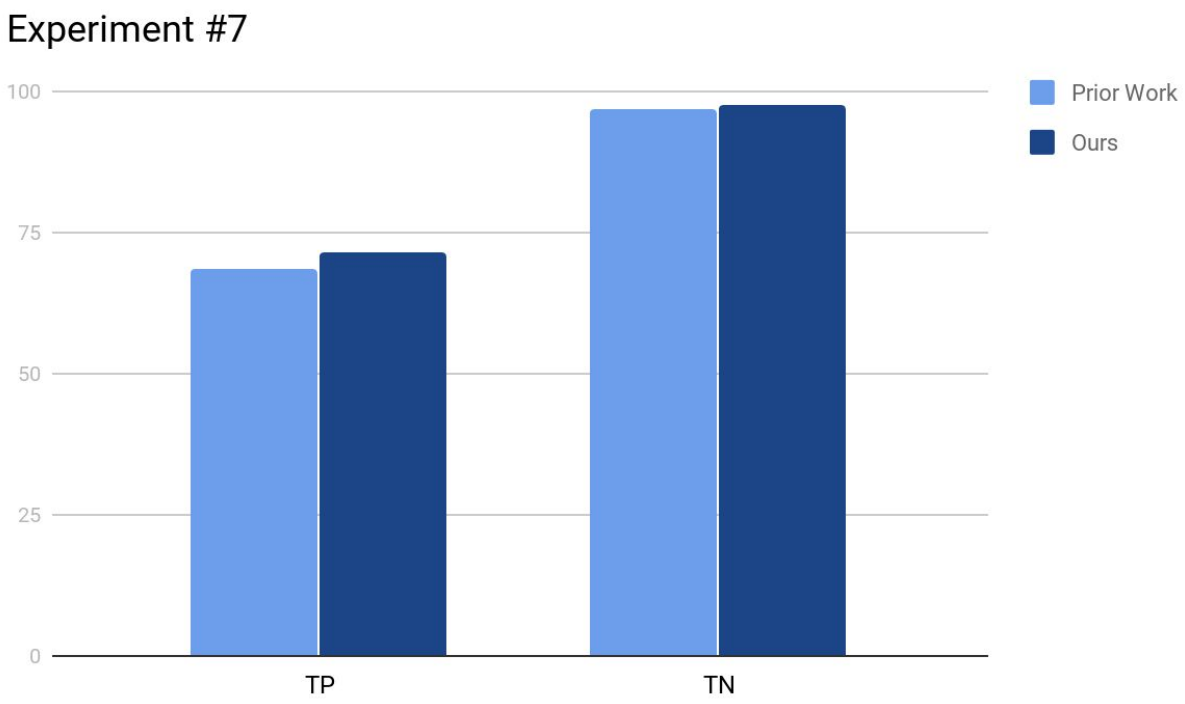


Experiment #7:

- Setups:
  - Type-3 Graph
  - Scenario #1
  - With subproblem

TP	Our TP	TN	Our TN
68.5	71.65	96.75	97.56

In comparison with the experiment #3, both our TP and TN increased. This is because of using the subproblems.

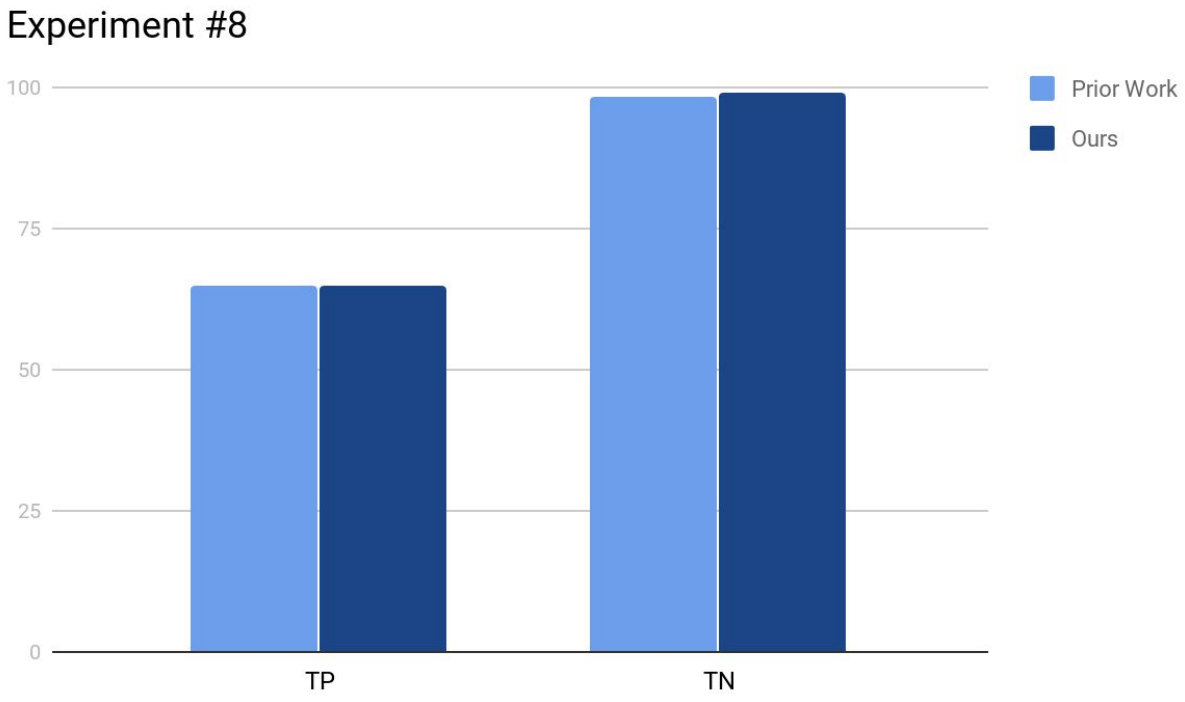


Experiment #8:

- Setups:
    - Type-3 Graph
    - Scenario #2
    - With subproblem

TP	Our TP	TN	Our TN
64.77	64.77	98.32	99.16

Since some the correctly detected data were removed, by using scenario #2, both our TN and TP accuracies were decreased.



Examples:
Two correctly identified people as not the same from our TN who were incorrectly identified as the same in experiment #5.
(left: camera #12 - right: camera #13)