Production Supporting Systems in Factories

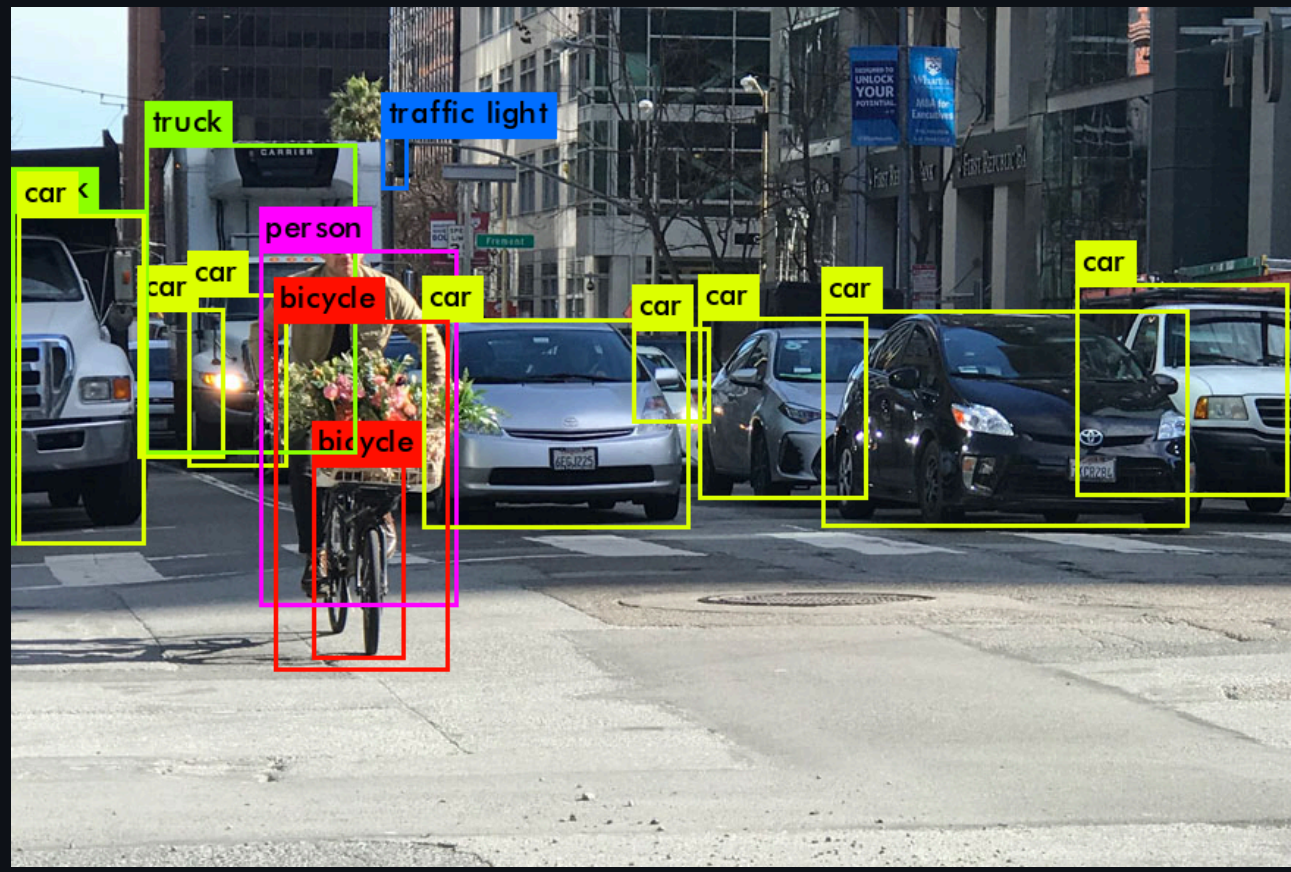
ระบบสนับสนุนการผลิตในโรงงานอุตสาหกรรม

Machine learning

> Object Detection

Object detection

- Car
  - Top: 500, Bottom: 200, Left: 50, right: 400
  - 50%
- Bicycle
  - ...
  - ...



COCO dataset

- *Common Objects in Context*
- Large-scale image recognition dataset for object detection, segmentation, and captioning tasks.
  - Contains over 330,000 images.
  - Annotated with 80 object categories.
- https://cocodataset.org/#explore

COCO SSD

- This model detects objects defined in the COCO dataset.
- Uses SSD algorithm
- Source
- Classes

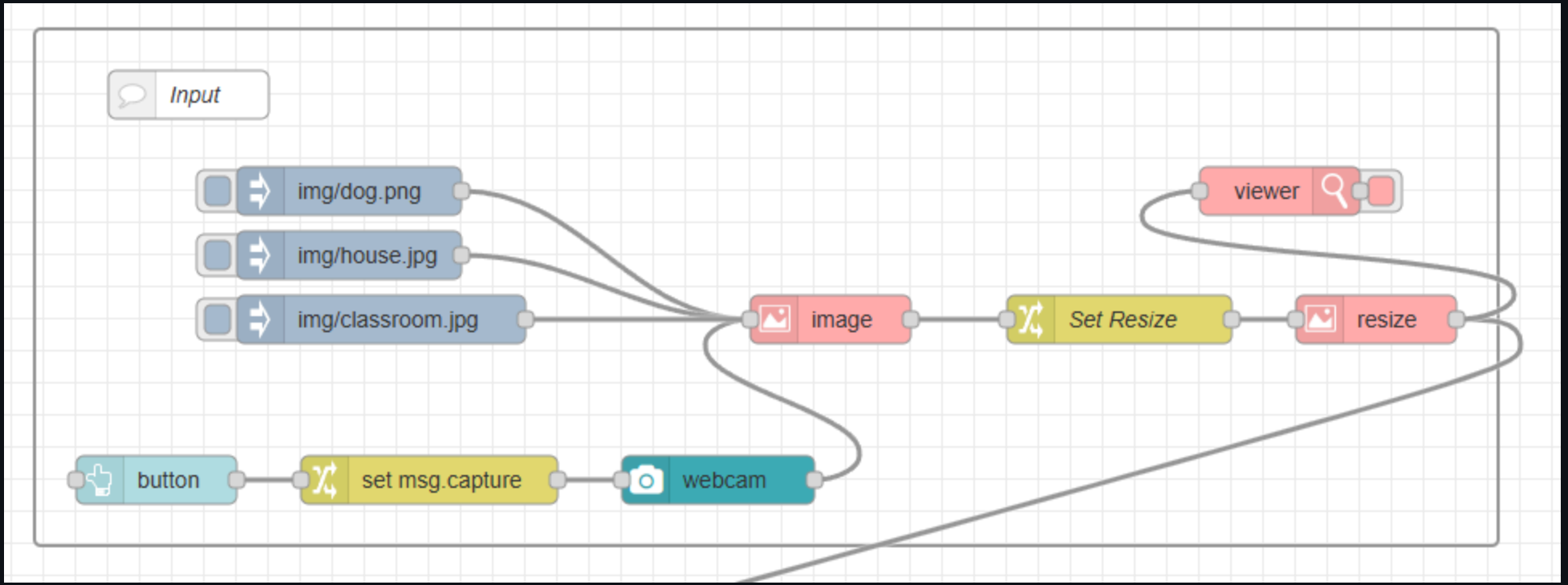
Setting up ML server

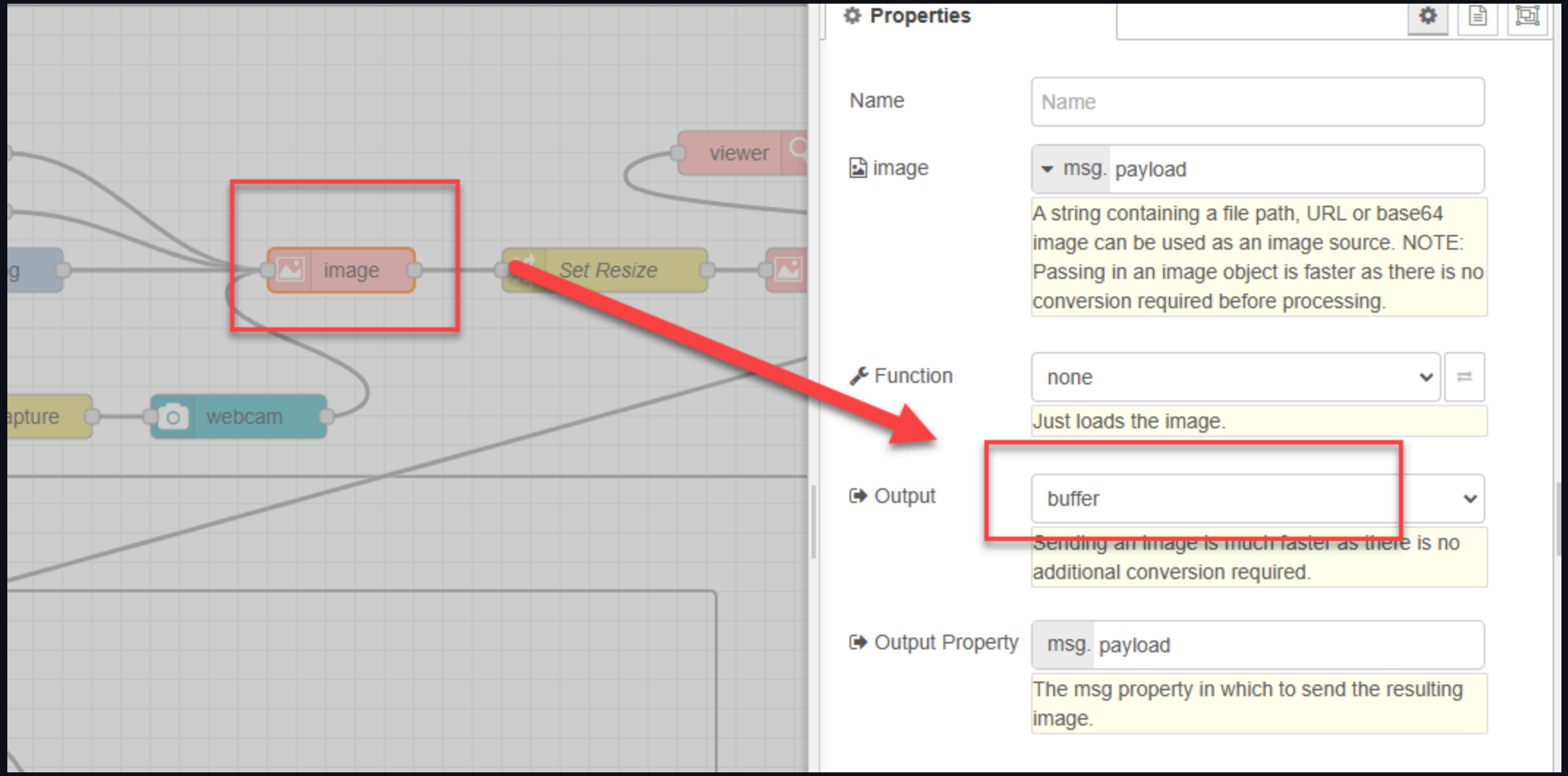
- Get code
- `pnpm install`
- `pnpm run build`
- `pnpm run start`
- Test if server is running.
  - http://localhost:3004

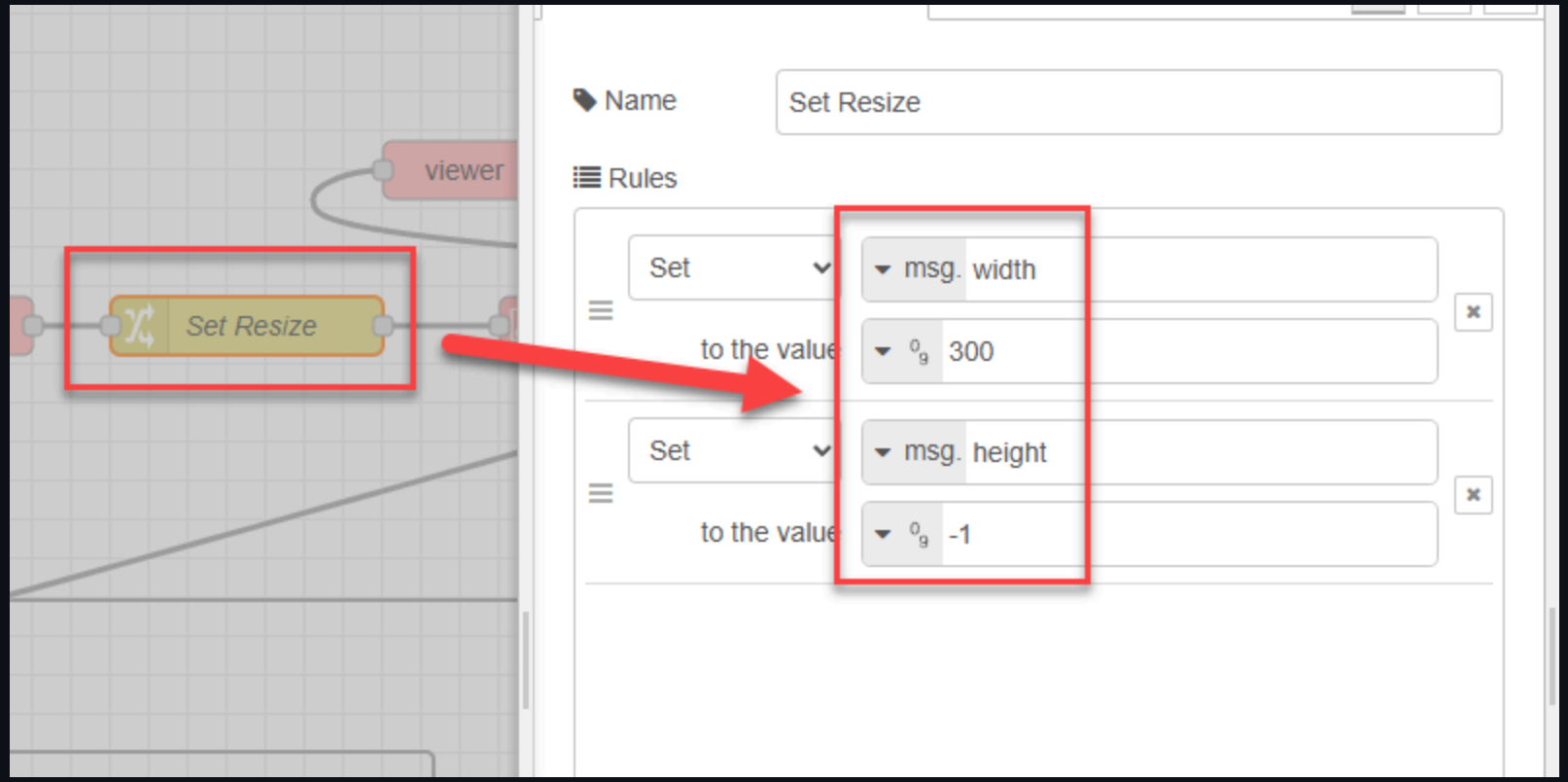
Preparing `node-red`

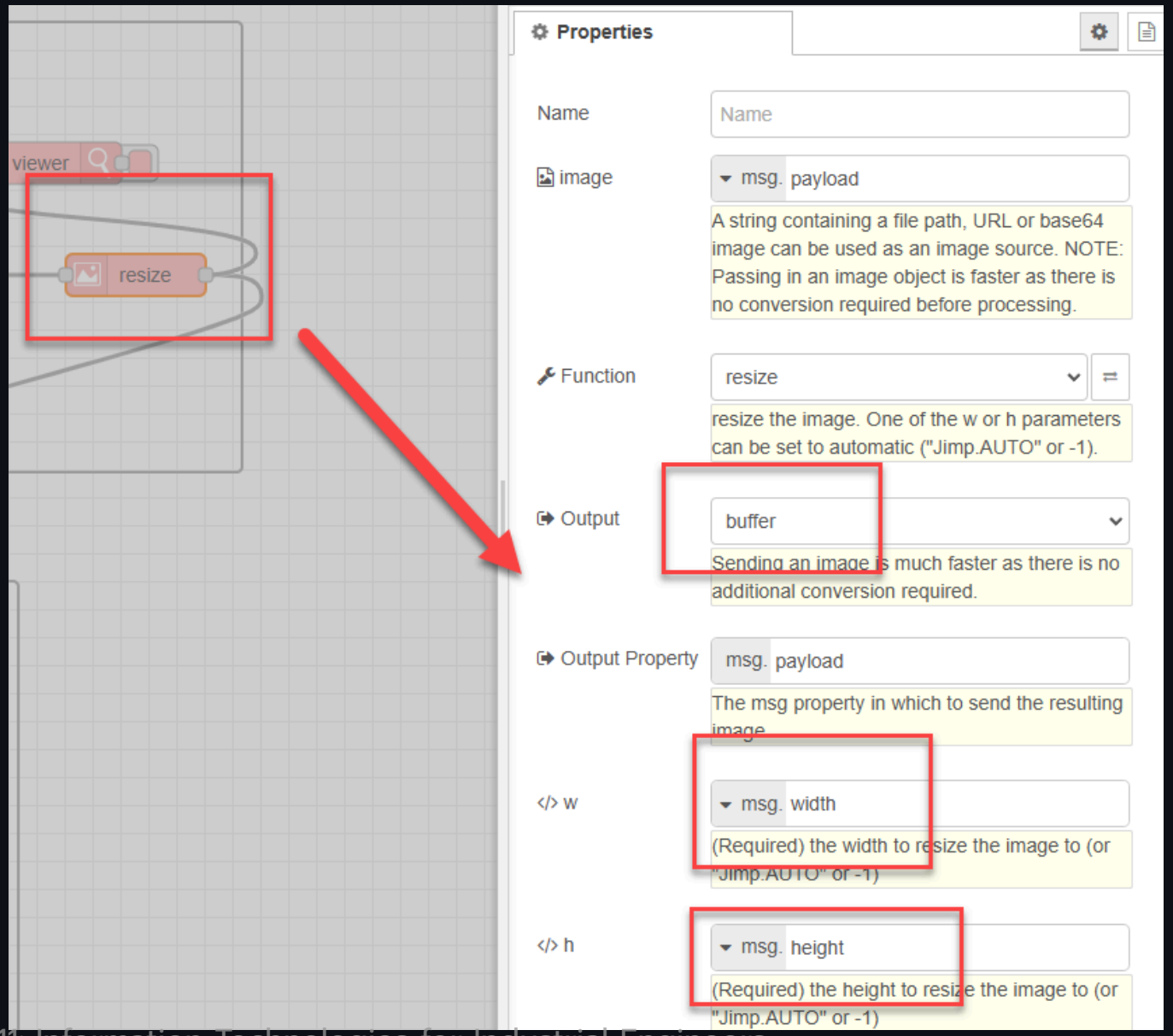
- `pnpm install node-red-contrib-image-tools node-red-node-ui-webcam node-red-dashboard`

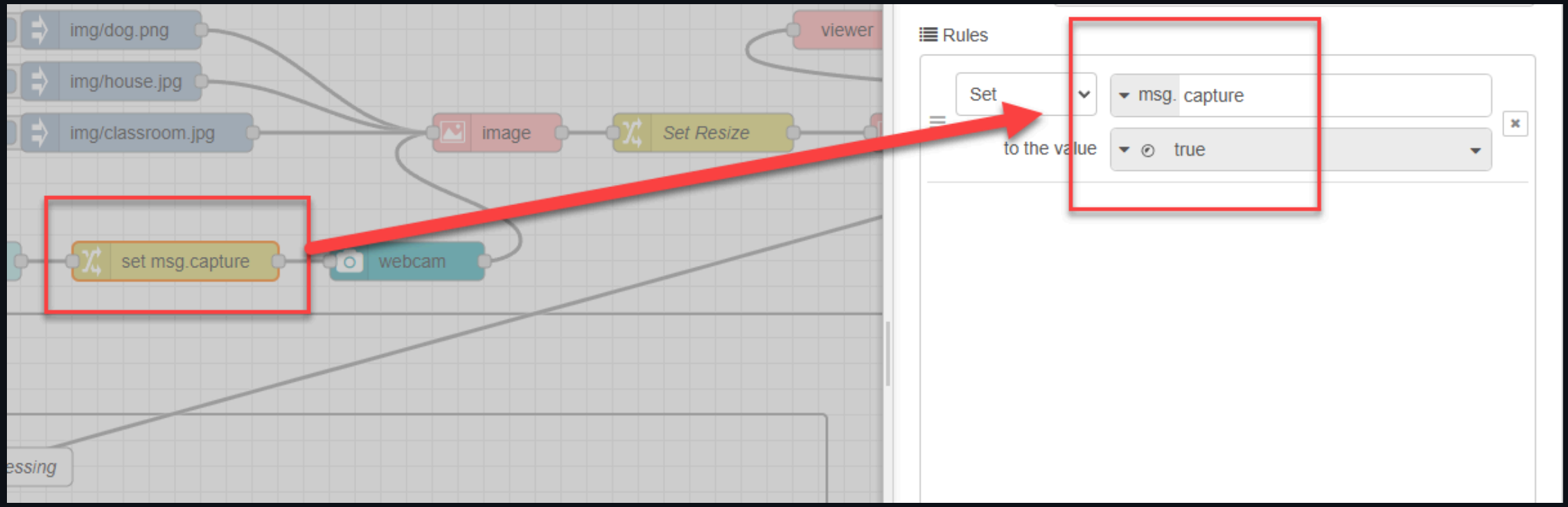
Input flow


Input
img/dog.png
img/house.jpg
img/classroom.jpg
image
Set Resize
resize
viewer
button
set msg.capture
webcam

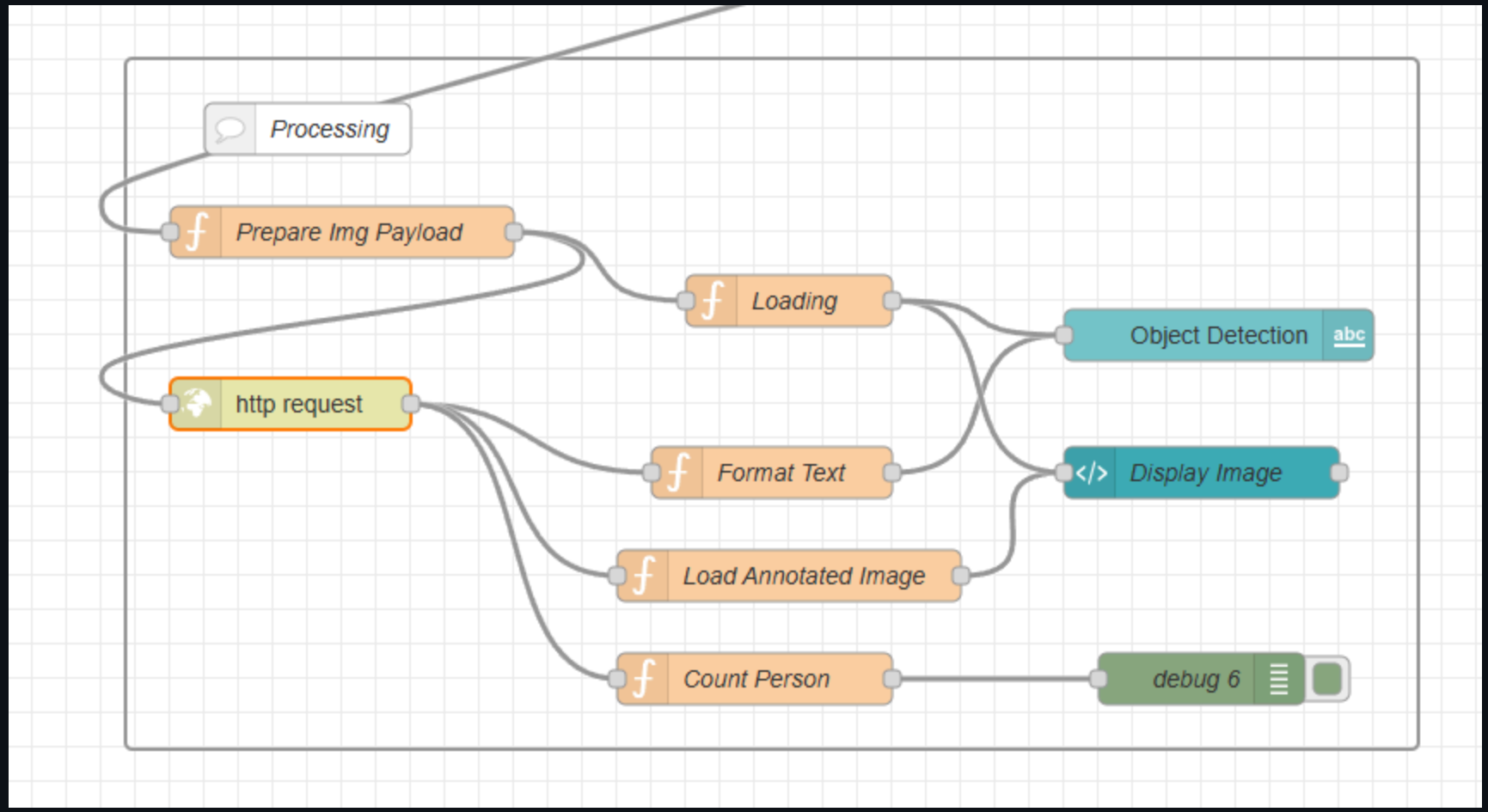

viewer
image
Set Resize
webcam
Properties
Name
Name
image
msg. payload
A string containing a file path, URL or base64 image can be used as an image source. NOTE: Passing in an image object is faster as there is no conversion required before processing.
Function
none
Just loads the image.
Output
buffer
Sending an image is much faster as there is no additional conversion required.
Output Property
msg. payload
The msg property in which to send the resulting image.


viewer
Set Resize
Name
Set Resize
Rules
Set
msg. width
to the value
300
Set
msg. height
to the value
-1


viewer
resize
Properties
Name
Name
image
msg. payload
A string containing a file path, URL or base64 image can be used as an image source. NOTE: Passing in an image object is faster as there is no conversion required before processing.
Function
resize
resize the image. One of the w or h parameters can be set to automatic ("Jimp.AUTO" or -1).
Output
buffer
Sending an image is much faster as there is no additional conversion required.
Output Property
msg. payload
The msg property in which to send the resulting image
</> w
msg. width
(Required) the width to resize the image to (or "Jimp.AUTO" or -1)
</> h
msg. height
(Required) the height to resize the image to (or "Jimp.AUTO" or -1)

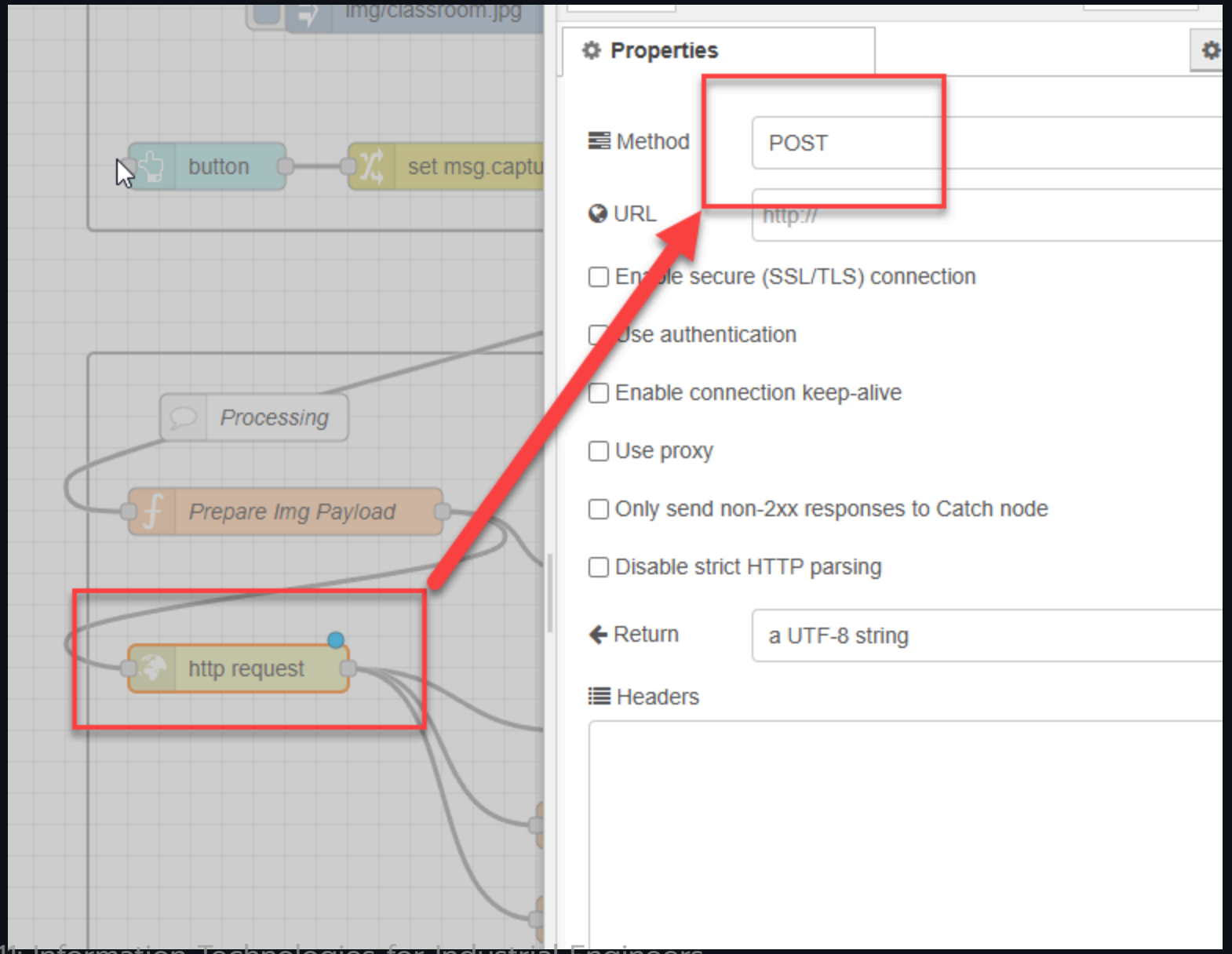

img/dog.png
img/house.jpg
img/classroom.jpg
image
Set Resize
viewer
set msg.capture
webcam
Rules
Set
msg. capture
to the value
true

Processing flow


Processing
Prepare Img Payload
Loading
Object Detection
abc
http request
Format Text
Display Image
Load Annotated Image
Count Person
debug 6

`Prepare Img Payload` function node

```
msg.payload = { imageEncoded: Buffer.from(msg.payload).toString("base64") };
msg.headers = { "Content-Type": "application/x-www-form-urlencoded" };
msg.url = "http://localhost:3004/upload_base64";
return msg;
```


img/classroom.jpg
button
set msg.captu
Processing
Prepare Img Payload
http request
Properties
Method
POST
URL
http://
Enable secure (SSL/TLS) connection
Use authentication
Enable connection keep-alive
Use proxy
Only send non-2xx responses to Catch node
Disable strict HTTP parsing
Return
a UTF-8 string
Headers

`Format Text` function node

```
const obj = JSON.parse(msg.payload);
let textOut = "";
for (const pred of obj.countsArr) {
  const classStr = pred.class;
  const count = pred.count;
  textOut += `👉${classStr} (x${count}) <br/>`;
}
if (!textOut) textOut = "<center><i>No Object Detected</i></center><br/>";
const dt = new Date();
const datestring = dt.toLocaleDateString();
const timestring = dt.toLocaleTimeString();
textOut += `<br/>📅${datestring} ⏰${timestring}`;
msg.payload = textOut;
return msg;
```

`Load Annotated Image` function node

```
const obj = JSON.parse(msg.payload);
const imageURL = obj.imageURL;
const html = `<img width="300px" src="${imageURL}" />`;
msg.payload = html;
return msg;
```

`Count Person` function node

```
// Select class here
const selectClass = "person";
// Code
const obj = JSON.parse(msg.payload);
msg.payload = obj.countsObj?.[selectClass] ?? 0;
return msg;
```

`Loading` function node

```
const html = `<center>Loading...</center>`;
msg.payload = html;
return msg;
```