



# Photo-Realistic Lighting System for AR Applications

## 適用於擴增實境應用之擬真打光系統



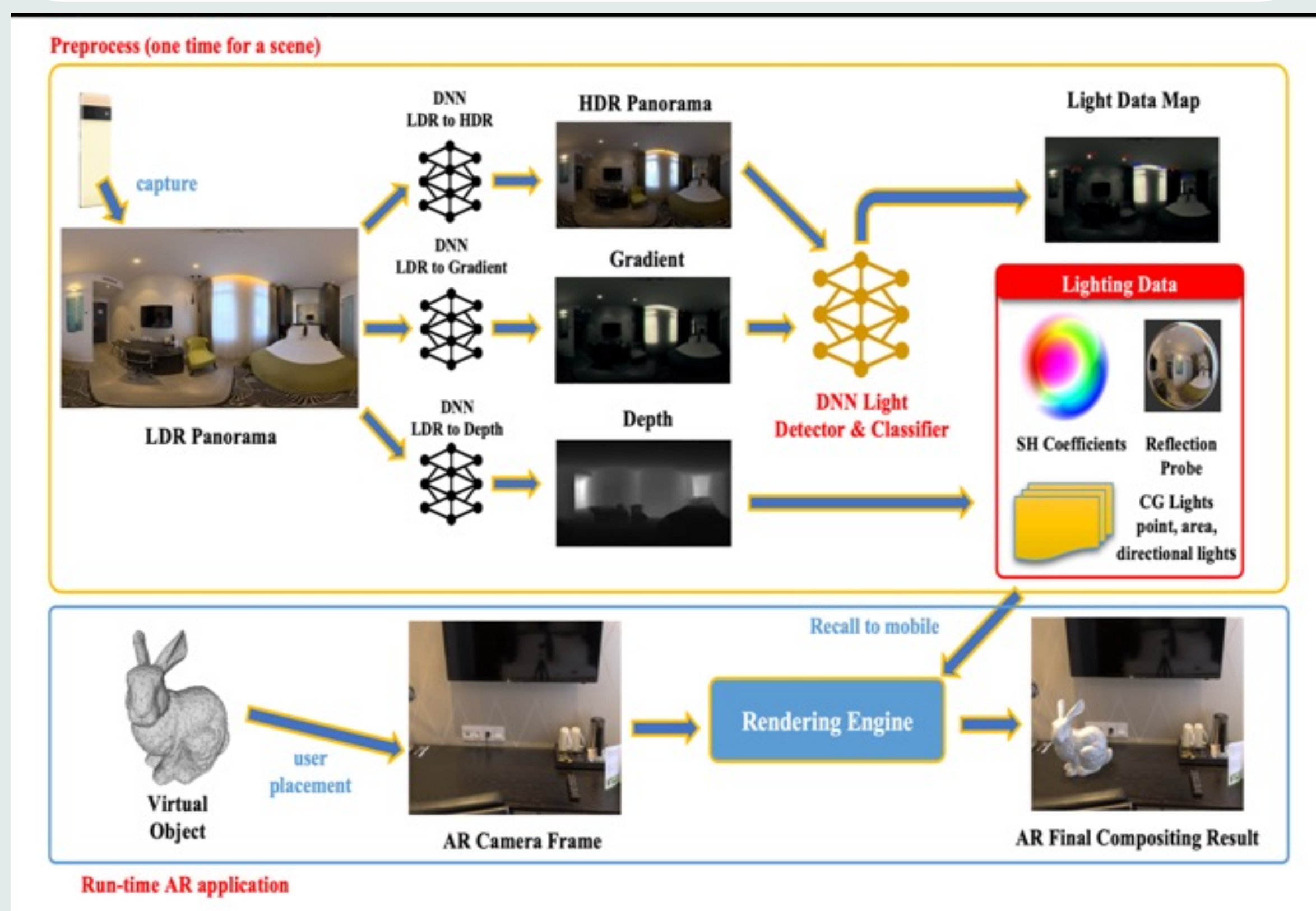
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### Motivation

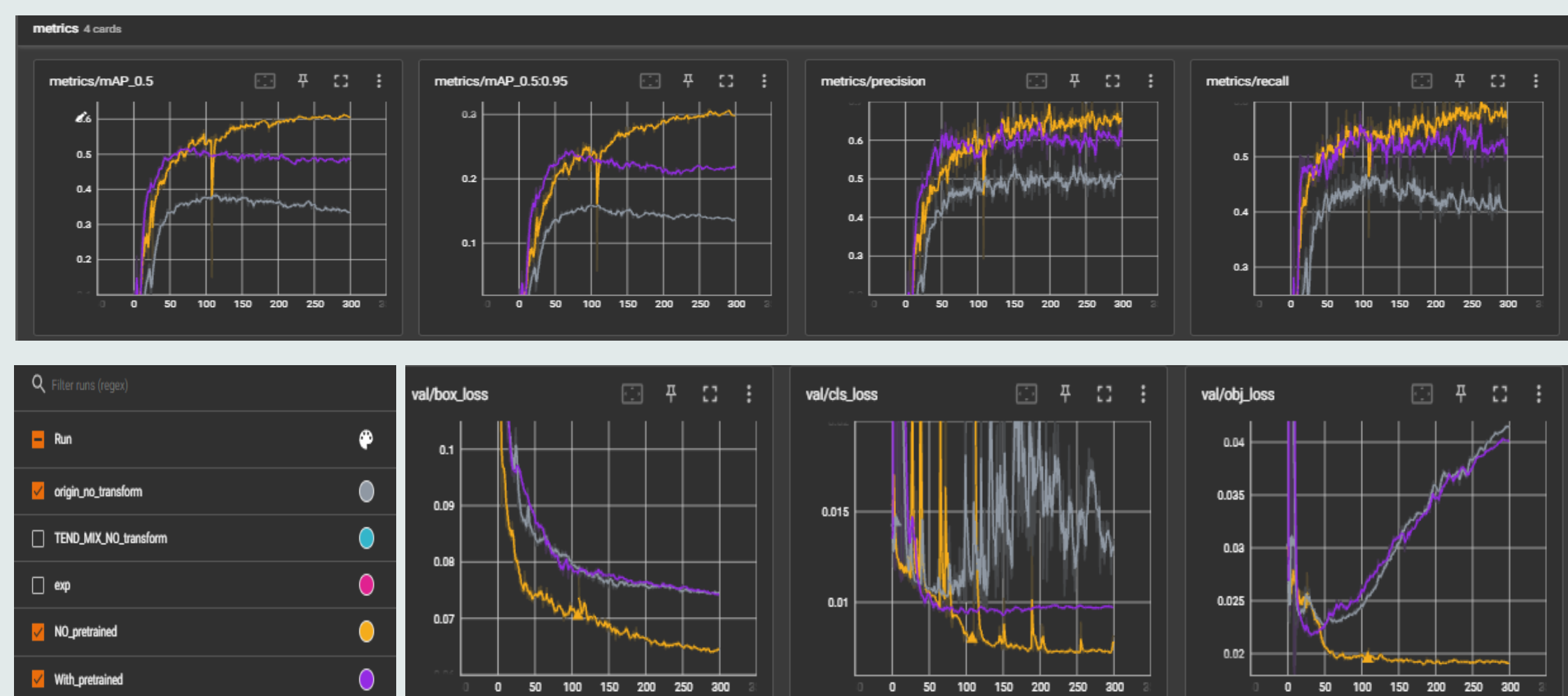
- Augmented reality (AR) applications have become widespread in our daily lives.
- To enhance the reality of the frame, AR applications should use lighting settings that match the real world when rendering virtual objects.
- Our project aims at designing a realistic lighting system for an AR application.

### Method

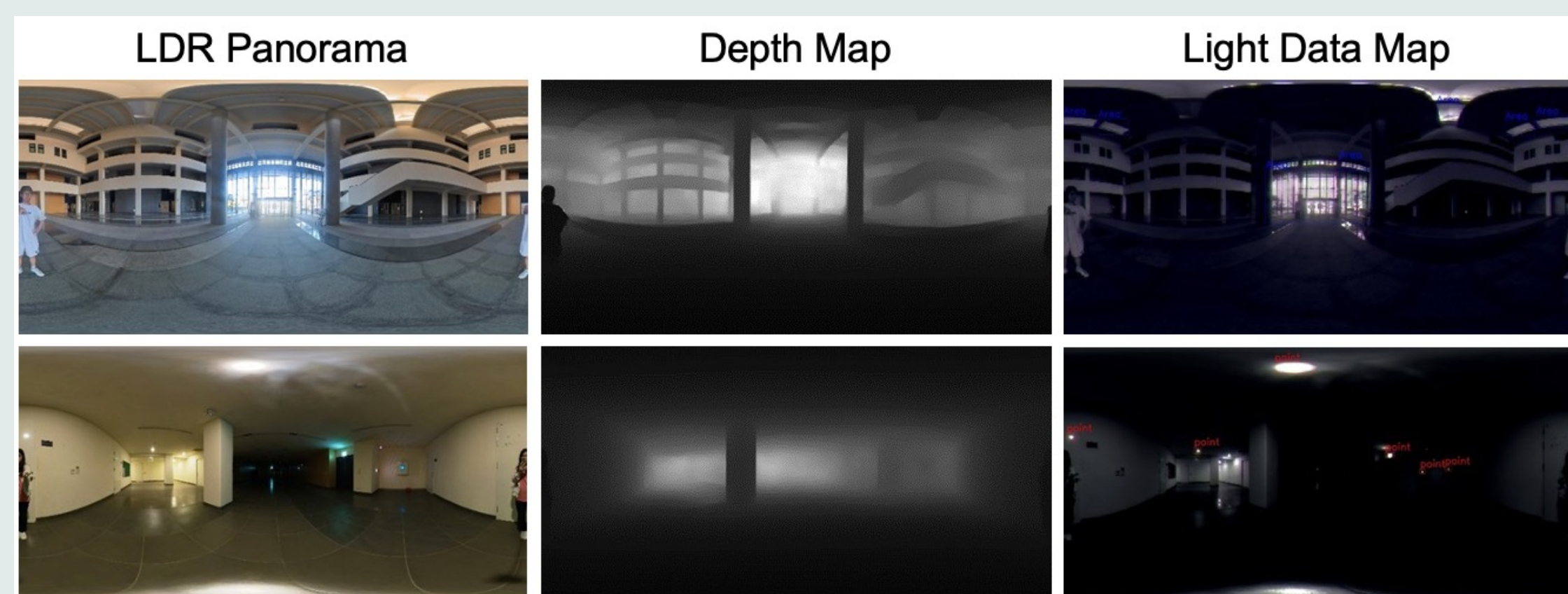


- Transfer the LDR 360 panorama taken by cell phone to the server
- Put a picture into the neural network for LDR to HDR, gradient, and depth, respectively
- Combine the gradient map with HDR, and mix the lighting classification that we labeled
- We distinguished the light into point light and area light, then put them into Yolov7 for training
- The lighting data is supplemented by the depth map after getting the light data map
- Put the light into the scene
- Generate the shadows of virtual objects in an AR environment
- We used median cut to make area light into several point lights

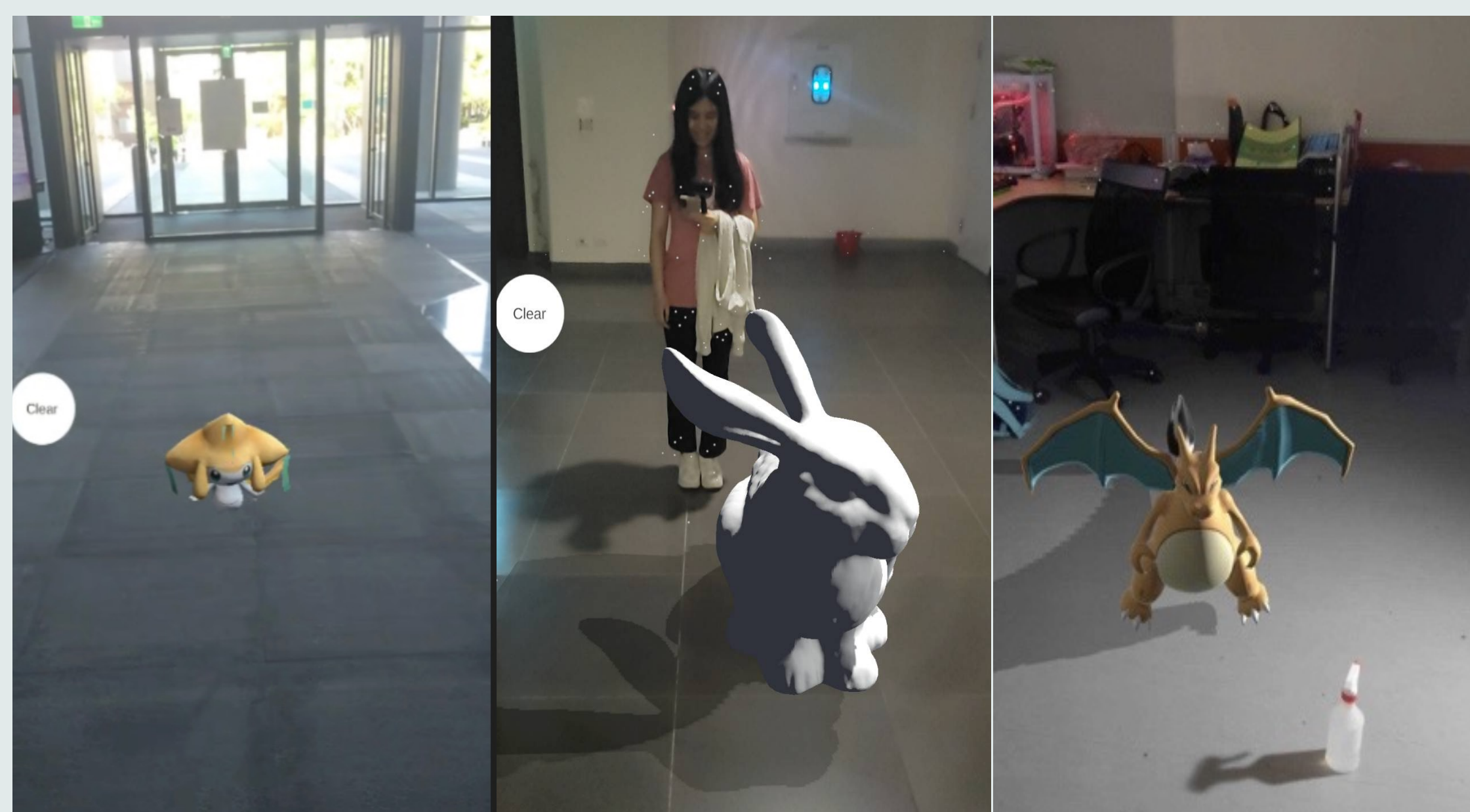
### Experimental Result



- If we add the gradient map, these curves will improve significantly (Grey to Orange)



- The above six are related pictures, and the below three are our result



### Conclusion

- Brand new method:
- 1. Simulate the area light by cutting it into several point lights -> the calculation is reduced greatly
- 2. Combine gradient map with HDR, then put it into Yolov7 -> Greatly improve the accuracy of judgment and classification
- 3. Integrate Unity with our neural network, and achieve the real-time rendering