

Supplementary materials

1. Prompts for generating textual safety perception description

We use the chain-of-thought (CoT) to prompt LLM to generate a safety perception evaluation system and use this system to score the given street view image (SVI). In this process, we fixed the temperature hyperparameter of LLM's text generation to 0.1, so that it will generate stable answers to the same prompt word, but it will not be completely consistent, but will show different emphases as the SVI changes.

For general description, we employ a two-stage CoT to design the prompt for LLM. In the first stage, we guide the model to build a safety perception assessment framework that systematically lists environmental factors that influence safety perception while eliminating human subjectivity. In the second stages, we provide SVI that need to be evaluated. Then we design prompt to evaluate these images using established safety perception evaluation framework to generate detailed safety perception descriptions that are consistent with the quantitative criteria identified in the first phase. In order to improve the performance of model operation and reduce the computing process of subsequent experiments, the number of questions answered in each round is set to 300 words.

The detailed prompt is shown as follows:

1. “Please design a street safety perception system rating scale and list in as much detail as possible the different information that people pay attention to in street perception by looking around the built environment (elements of the urban environment that Street View images can capture). Note that we cannot provide subjective information about residents' personal experiences, so look for key points from the objective environment, please answer this question within 300 words.”
2. “Based on your answers, evaluate the safety perception brought to you by the street scenes in the panoramic street view image one by one. Please answer this question within 300 words.” (with provided SVI)

For demographic and scenario-specific description, we adopt a four-stage CoT to design LLM prompts, in which we add our pre-designed perception scenarios, location, gender, and age. Similarly, in order to improve the performance of model operation and reduce the computational process of subsequent experiments, the number of questions answered in each round is set to 300 words. In the first stage, similar to the general

description, we guide the model to build a safety perception evaluation framework, systematically list the environmental factors that affect safety perception, and eliminate human subjectivity. We add specific perception scenarios to guide LLM to generate differentiated perceptions for different scenarios. In the second stage, we provide SVI to be evaluated. Then, we design prompts to evaluate these images using the established safety perception evaluation framework, given gender, to generate detailed safety perception descriptions consistent with the quantitative standards determined in the first stage. In the third stage, we add the element of gender based on the perception descriptions in the previous stage. Then, we design prompts to evaluate these images using the established safety perception evaluation framework. Finally, we add the element of age based on the perception descriptions in the previous stage. We then design prompts to evaluate these images using an established safety-awareness evaluation framework.

The detailed prompt is shown as follows:

1. “Please design a (*perception scenario, traffic accident / crime activity*)-focused street safety perception system list briefly and include different information that people pay attention to in street perception by looking around the built environment (elements of the urban environment that Street View images can capture). Please pay special attention to the fact that people of different ages and genders may have different perceptions and reactions. Note that we cannot provide subjective information about residents' personal experiences, so look for key points from the objective environment, please answer this question within 300 words.”
2. “When discussing the safety perception in (*location*), what is the characteristics of the built environment, and how these characteristics will influence people's safety perception? Please answer this question within 300 words.” (with provided SVI)
3. “Based on Q2's answer, when evaluating the safety perception of specific criminal behaviors, it is important to consider the sensitivity of different demographic groups to their environment. For (*gender, male / female*) as a pedestrian, which parts of the image would you emphasize? Please answer this question within 300 words.” (with provided SVI)
4. “Based on Q2's answer, for people (age, *greater than 45 / lower than 45*), what factors in the image do you think would impact their sense of safety? Please answer this question within 300 words.” (with provided SVI)

2. Textual safety perception descriptions

Here is an example for general textual safety perception descriptions:

Q1:

“Please design a street safety perception system rating scale and list in as much detail as possible the different information that people pay attention to in street perception by looking around the built environment (elements of the urban environment that Street View images can capture). Note that we cannot provide subjective information about residents’ personal experiences, so look for key points from the objective environment, please answer this question within 300 words.”

A:

- In terms of street safety perception, there are several elements that people pay attention to in their perception of the built environment. These include:
 - 1. Traffic signs and signals: In the image, there is a sign on the left side of the street. This sign may provide information about traffic rules, speed limits, or directions.
 - 2. Road markings: The street in the image has clear lane markings, which help drivers and pedestrians understand the layout of the road and where to position themselves.
 - 3. Pedestrian crossings: Although not visible in the image, pedestrian crossings are an important element of street safety perception. They provide a designated area for pedestrians to cross the street safely.
 - 4. Street lighting: The image does not show any street lighting, but it is an important element of street safety perception, particularly during nighttime or low-light conditions.
 - 5. Building design and maintenance: The building in the image has a red facade and large windows, which may indicate that it is well-maintained and visually appealing. The design of buildings can impact the perception of safety and aesthetics in a street scene.
 - 6. Vegetation: There is no visible vegetation in the image, but trees and other greenery can contribute to a sense of safety and well-being in a street scene.
 - 7. Traffic flow: The image does not show any moving vehicles, but the flow of traffic can impact the perception of safety in a street scene.
- In terms of a rating scale for street safety perception, one possible approach is to use a Likert scale, where participants rate their perception of safety on a scale from 1 to 5, with 1 being “not at all safe” and 5 being “very safe.” The different elements of the built environment can be rated based on their perceived impact on safety. For example, a well-maintained building with clear lane markings and a sign indicating traffic rules might be rated higher for safety perception than a poorly

maintained building with no clear lane markings and no visible signage. Overall, street safety perception is a complex issue

Q2: Based on your answers, evaluate the safety perception brought to you by the street scenes in the panoramic street view image one by one. Please answer this question within 300 words.' (with provided SVI)

A:

- The panoramic street view image shows a street scene with a building on the left side and a clear blue sky above. The building has a red facade with large windows, and there is a sign on the left side of the street. The street itself is paved and appears to be well-maintained.

In terms of street safety perception, the image suggests a relatively safe environment. The building appears to be well-maintained, which may indicate that the area is well-cared for and that the local government is attentive to the maintenance of public spaces. The clear blue sky suggests that the weather is pleasant, which may also contribute to a sense of safety and well-being.

The presence of a sign on the left side of the street indicates that there are traffic rules and regulations in place, which may help to maintain order and safety on the streets. The paved street itself appears to be well-maintained, which may also contribute to a sense of safety and order.

Overall, the street scene in the image suggests a relatively safe environment, with well-maintained buildings, clear signage, and a pleasant weather condition. The presence of a sign on the left side of the street may also indicate that there are traffic rules and regulations in place, which may help to maintain order and safety on the streets.,

Here is an example for general textual safety perception descriptions:

Q1: Please design a car accident-focused street safety perception system list briefly and include different information that people pay attention to in street perception by looking around the built environment (elements of the urban environment that Street View images can capture). Please pay special attention to the fact that people of different ages and genders may have different perceptions and reactions. Note that we cannot provide subjective information about residents' personal experiences, so look for key points from the objective environment, please answer this question within 300 words.

A:

Designing a car accident-focused street safety perception system involves considering various elements of the urban environment that can be captured in Street View images.

Here are some key points to consider:

1. Traffic Signs and Signals: These are crucial for regulating traffic and ensuring safety. In the image, there are traffic lights and signs that provide guidance to drivers and pedestrians.
2. Pedestrian Crossings: The presence of pedestrian crossings can influence how drivers approach intersections. In the image, there is a pedestrian crossing, which can be a focal point for drivers to be cautious.
3. Road Markings: Clear and visible road markings can help drivers understand the road layout and make safe decisions. In the image, there are lane markings that indicate the direction of traffic.
4. Pedestrian Walkways: The presence of pedestrian walkways can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian walkway on the right side of the road.
5. Vehicle Speed: The speed at which vehicles are traveling can significantly impact the likelihood of an accident. In the image, there is a speed limit sign, which can help drivers understand the appropriate speed for the area.
6. Visibility: The visibility of the road and surrounding environment can affect drivers' ability to anticipate potential hazards. In the image, there are trees and buildings that can obstruct the view of drivers, especially if they are not paying attention.
7. Parking and Traffic Flow: The way vehicles are parked and the flow of traffic can impact safety. In the image, there are parked vehicles on the side of the road, which can influence how drivers navigate the area.
8. Pedestrian Behavior: The behavior of pedestrians can also impact safety. In the image, there are no pedestrians visible, which might suggest that the area is relatively safe for drivers.
9. Weather Conditions: Weather conditions can affect visibility and road conditions, which can impact safety. In the image, the sky is clear, which might suggest that the weather is favorable for driving.
10. Time of Day: The time of day can affect visibility and traffic flow. In the image, it appears to be daytime, which might suggest that visibility is generally good, and traffic flow is likely to be more predictable compared to nighttime or rush hours. However, during peak hours, increased traffic density could raise the risk of accidents.

Q2: When discussing the safety perception in Hong Kong, what are the characteristics of the built environment, and how do these characteristics influence people's safety perception? Please answer this question within 300 words (with provided SVI).

A:

The built environment in Hong Kong is characterized by a dense urban setting, with

high-rise buildings, narrow streets, and a mix of commercial and residential areas. These characteristics can influence people's safety perception in several ways:

1. Visibility: The density of buildings and the narrowness of streets can limit visibility for both drivers and pedestrians. This can make it more challenging to anticipate potential hazards, such as vehicles or pedestrians crossing the street.
2. Pedestrian Crossings: The presence of pedestrian crossings can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian crossing, which can be a focal point for drivers to be cautious.
3. Road Markings: Clear and visible road markings can help drivers understand the road layout and make safe decisions. In the image, there are lane markings that indicate the direction of traffic.
4. Pedestrian Walkways: The presence of pedestrian walkways can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian walkway on the right side of the road.
5. Vehicle Speed: The speed at which vehicles are traveling can significantly impact the likelihood of an accident. In the image, there is a speed limit sign, which can help drivers understand the appropriate speed for the area.
6. Parking and Traffic Flow: The way vehicles are parked and the flow of traffic can impact safety. In the image, there are parked vehicles on the side of the road, which can influence how drivers navigate the area.
7. Time of Day: The time of day can affect visibility and traffic flow. In the image, it appears to be daytime, which might suggest that the weather is favorable for driving.
8. Weather Conditions: Weather conditions can affect visibility and road conditions, which can impact safety. In the image, the sky is clear, which might suggest that the weather is favorable for driving.
9. Pedestrian Behavior: The behavior of pedestrians can also impact safety. In the image, there are no pedestrians visible, which might suggest that the area is relatively safe for drivers.
10. Street Lighting: The availability of street lighting can impact safety, particularly during night time. In Hong Kong, where the urban environment is densely packed, street lighting plays a crucial role in enhancing visibility and reducing the risk of accidents or criminal activities. In the image, although it is daytime, the presence of streetlights suggests that the area is likely well-lit at night, contributing to a safer environment.

Q3: Based on Q2's evaluation, when evaluating the safety perception of specific criminal behaviors, it is important to consider the sensitivity of different demographic groups to their environment. For female as a pedestrian, which parts of the image would

you emphasize? Please answer this question within 300 words (with provided SVI).

A:

When evaluating the safety perception of specific criminal behaviors, it is important to consider the sensitivity of different demographic groups to their environment. For female pedestrians, the following parts of the image could be emphasized:

1. Visibility: Female pedestrians may be more concerned about visibility than male pedestrians. In the image, there are trees and buildings that can obstruct the view of drivers, especially if they are not paying attention.
2. Pedestrian Crossings: The presence of pedestrian crossings can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian crossing, which can be a focal point for drivers to be cautious.
3. Road Markings: Clear and visible road markings can help drivers understand the road layout and make safe decisions. In the image, there are lane markings that indicate the direction of traffic.
4. Pedestrian Walkways: The presence of pedestrian walkways can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian walkway on the right side of the road.
5. Vehicle Speed: The speed at which vehicles are traveling can significantly impact the likelihood of an accident. In the image, there is a speed limit sign, which can help drivers understand the appropriate speed for the area.
6. Parking and Traffic Flow: The way vehicles are parked and the flow of traffic can impact safety. In the image, there are parked vehicles on the side of the road, which can influence how drivers navigate the area.
7. Time of Day: The time of day can affect visibility and traffic flow. In the image, it appears to be daytime, which might suggest that the weather is favorable for driving.
8. Weather Conditions: Weather conditions can affect visibility and road conditions, which can impact safety. In the image, the sky is clear, which might suggest that the weather is favorable for driving.
9. Pedestrian Behavior: The behavior of pedestrians can also impact safety. In the image, there are no pedestrians visible, which might suggest that the area is relatively safe for drivers.
10. Street Lighting: Female pedestrians may be more concerned about street lighting than male pedestrians, especially during nighttime. Adequate lighting can enhance visibility, reduce the risk of accidents, and deter criminal activities. In the image, although it is daytime, the presence of streetlights suggests that the area is likely well-lit at night, which can contribute to a sense of safety.

Q4: Based on Q2's evaluation, For senior citizens in the age higher than 45 years old, what factors in the image do you think would impact their sense of safety? Please

answer this question within 300 words (with provided SVI).

A:

For people in the age of 60, several factors in the image could impact their sense of safety:

1. Visibility: Older adults may be more concerned about visibility than younger adults. In the image, there are trees and buildings that can obstruct the view of drivers, especially if they are not paying attention.
 2. Pedestrian Crossings: The presence of pedestrian crossings can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian crossing, which can be a focal point for drivers to be cautious.
 3. Road Markings: Clear and visible road markings can help drivers understand the road layout and make safe decisions. In the image, there are lane markings that indicate the direction of traffic.
 4. Pedestrian Walkways: The presence of pedestrian walkways can encourage people to walk rather than drive, reducing the risk of accidents. In the image, there is a pedestrian walkway on the right side of the road.
 5. Vehicle Speed: The speed at which vehicles are traveling can significantly impact the likelihood of an accident. In the image, there is a speed limit sign, which can help drivers understand the appropriate speed for the area.
 6. Parking and Traffic Flow: The way vehicles are parked and the flow of traffic can impact safety. In the image, there are parked vehicles on the side of the road, which can influence how drivers navigate the area.
 7. Time of Day: The time of day can affect visibility and traffic flow. In the image, it appears to be daytime, which might suggest that the weather is favorable for driving.
 8. Weather Conditions: Weather conditions can affect visibility and road conditions, which can impact safety. In the image, the sky is clear, which might suggest that the weather is favorable for driving.
 9. Pedestrian Behavior: The behavior of pedestrians can also impact safety. In the image, there are no pedestrians visible, which might suggest that the area is relatively safe for drivers.
 10. Street Lighting: Older adults may be more concerned about street lighting than younger adults. In the image, there are no visible street lights, which might suggest that the area is not well-lit at night.
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When assessing people with different gender (males or females)'s safety perception, we only utilize the generated text description from Q3; whereas when evaluating people with different gender (middle-aged or elderly)'s safety perception safety perception, we only utilize the generated text description from Q4.