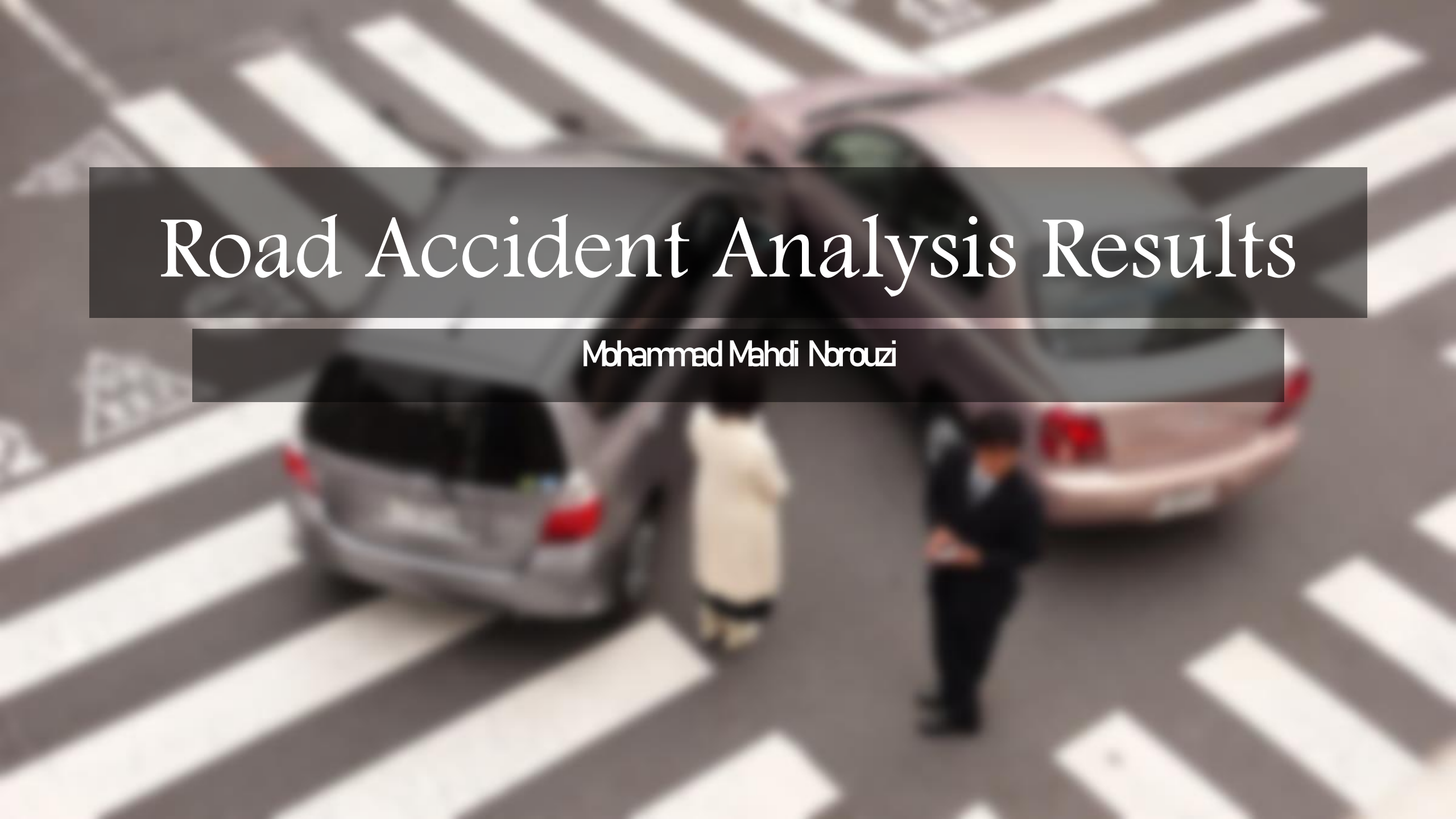
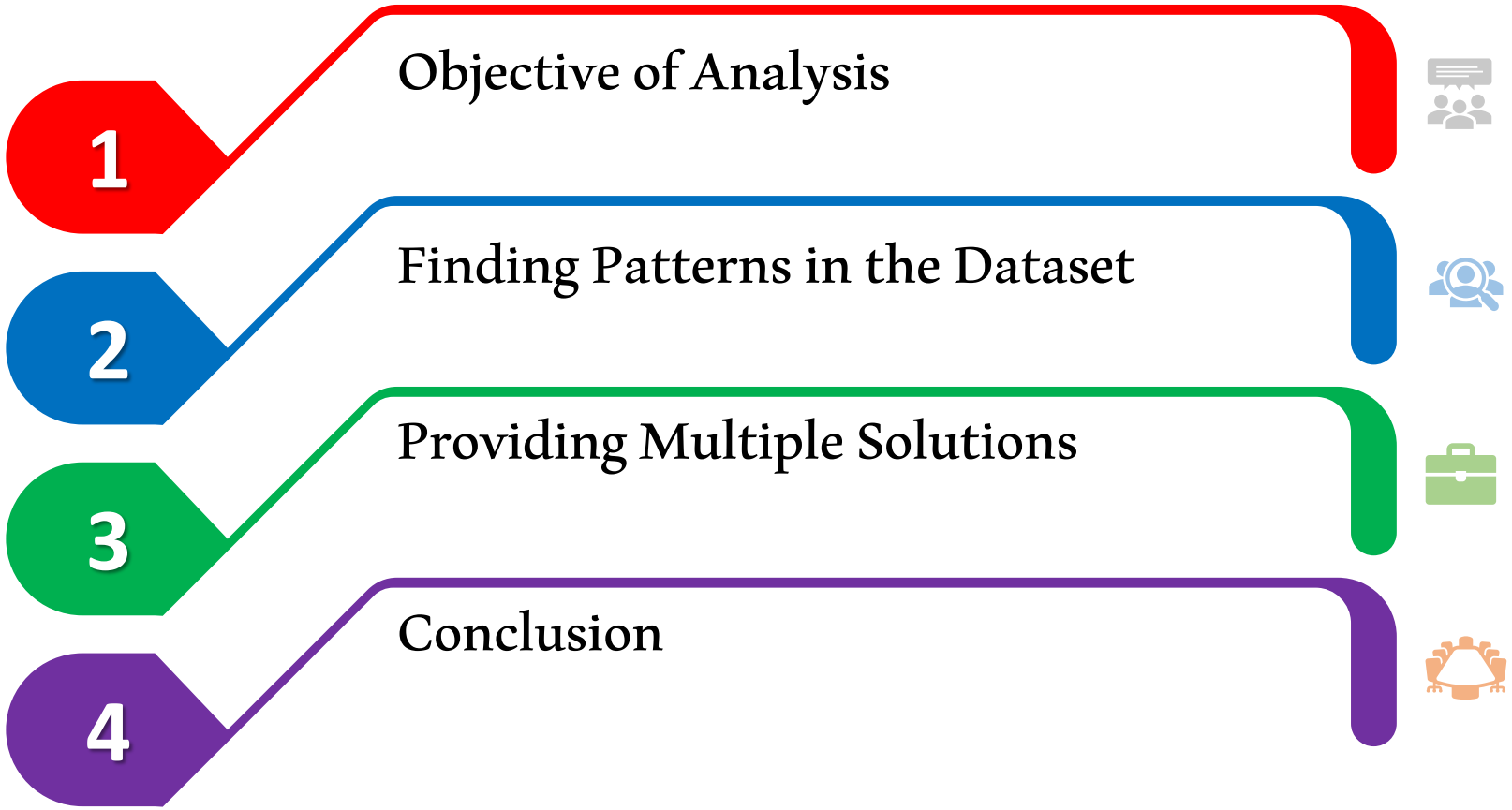


# Road Accident Analysis Results

Mohammad Mahdi Norouzi

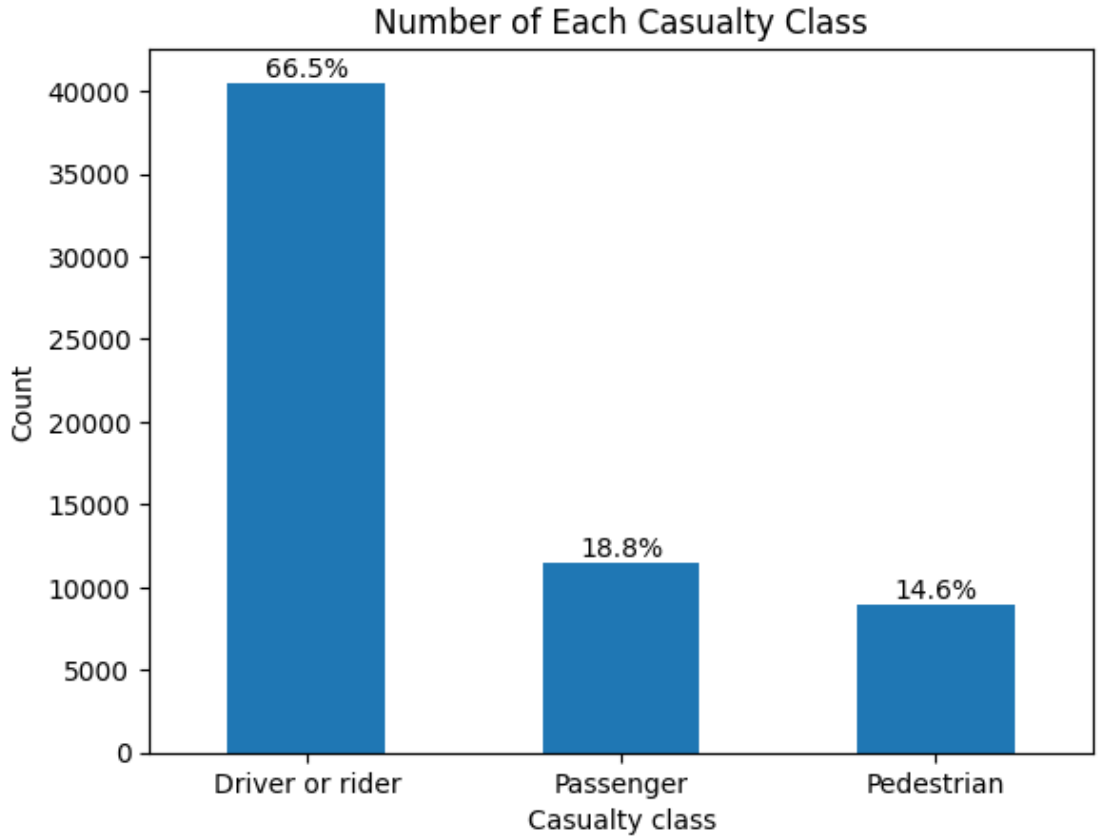

1
Objective of Analysis
2
Finding Patterns in the Dataset
3
Providing Multiple Solutions
4
Conclusion

# 1 Objective

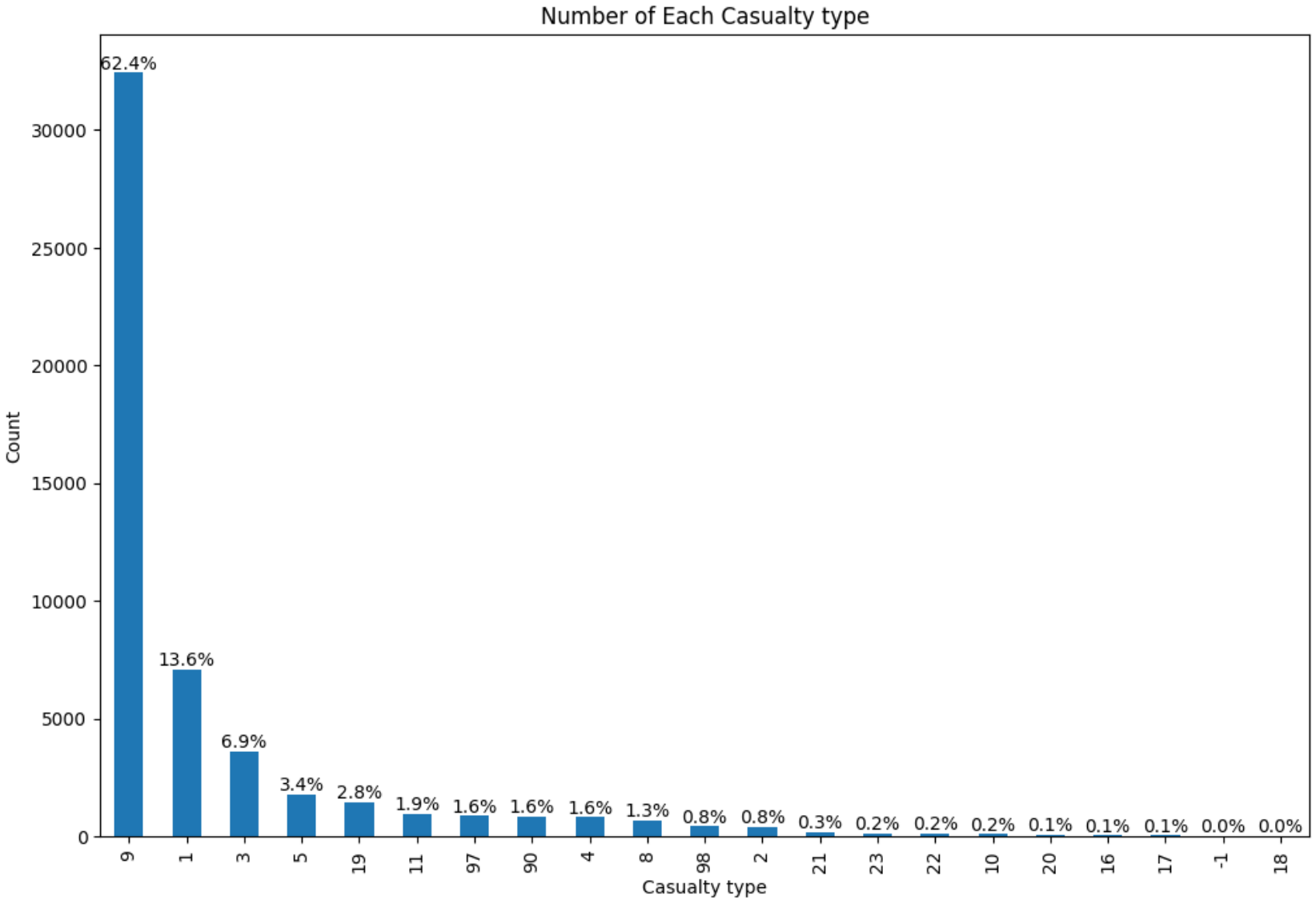
- We aim to extract patterns and useful information from the provided dataset. The first and simplest method involves analyzing the number of casualties according to different parameters, such as pedestrian location, age of casualties, and others.
  In the subsequent slides, we will illustrate these relationships and provide explanations for each.

## 2 Patterns

- According to the plot below, we can observe that 66.5 percent of casualties are drivers or riders. From this result, we can conclude that in the majority of accidents, there are either no pedestrians or passengers involved. Alternatively, if passengers are present, they are less likely to become casualties.



- The plot below displays that over 60 percent of driver or rider casualties are car occupants, with cyclists being the second most affected group.

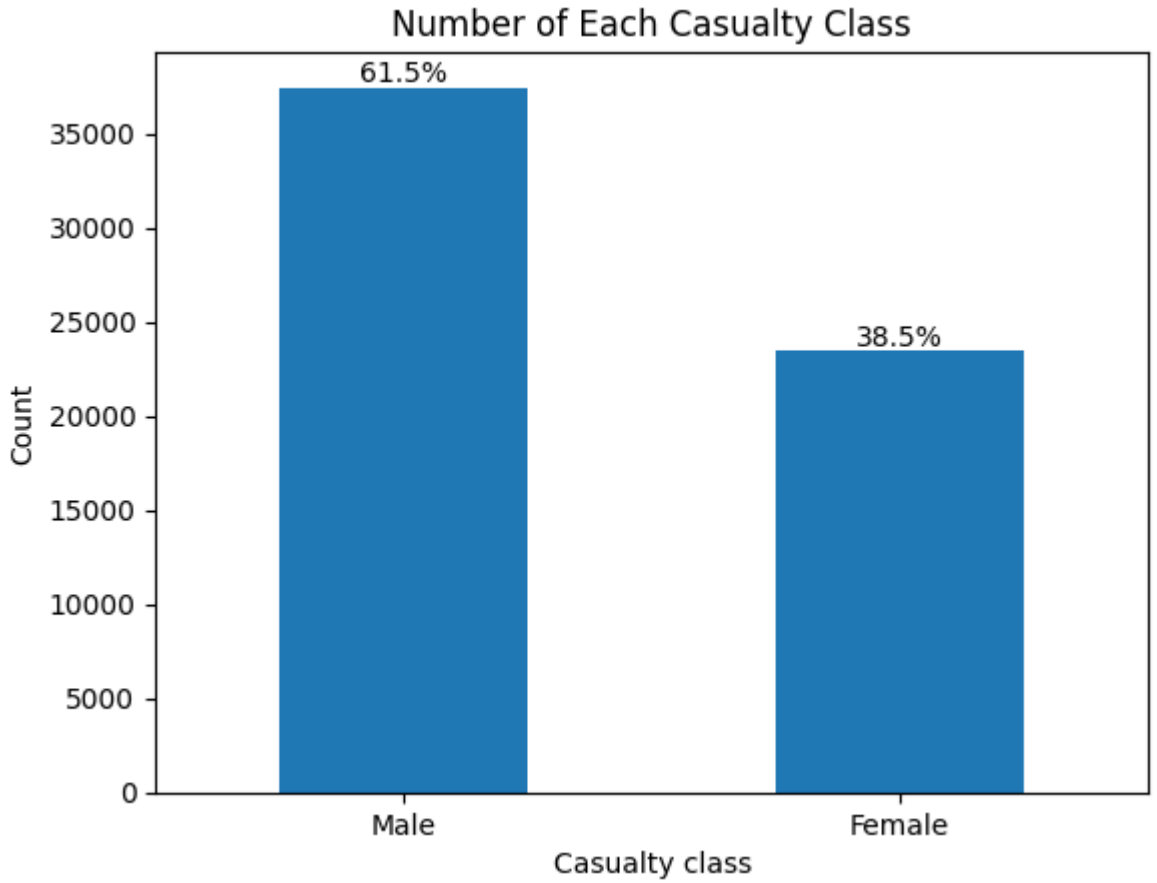



Casualty type:

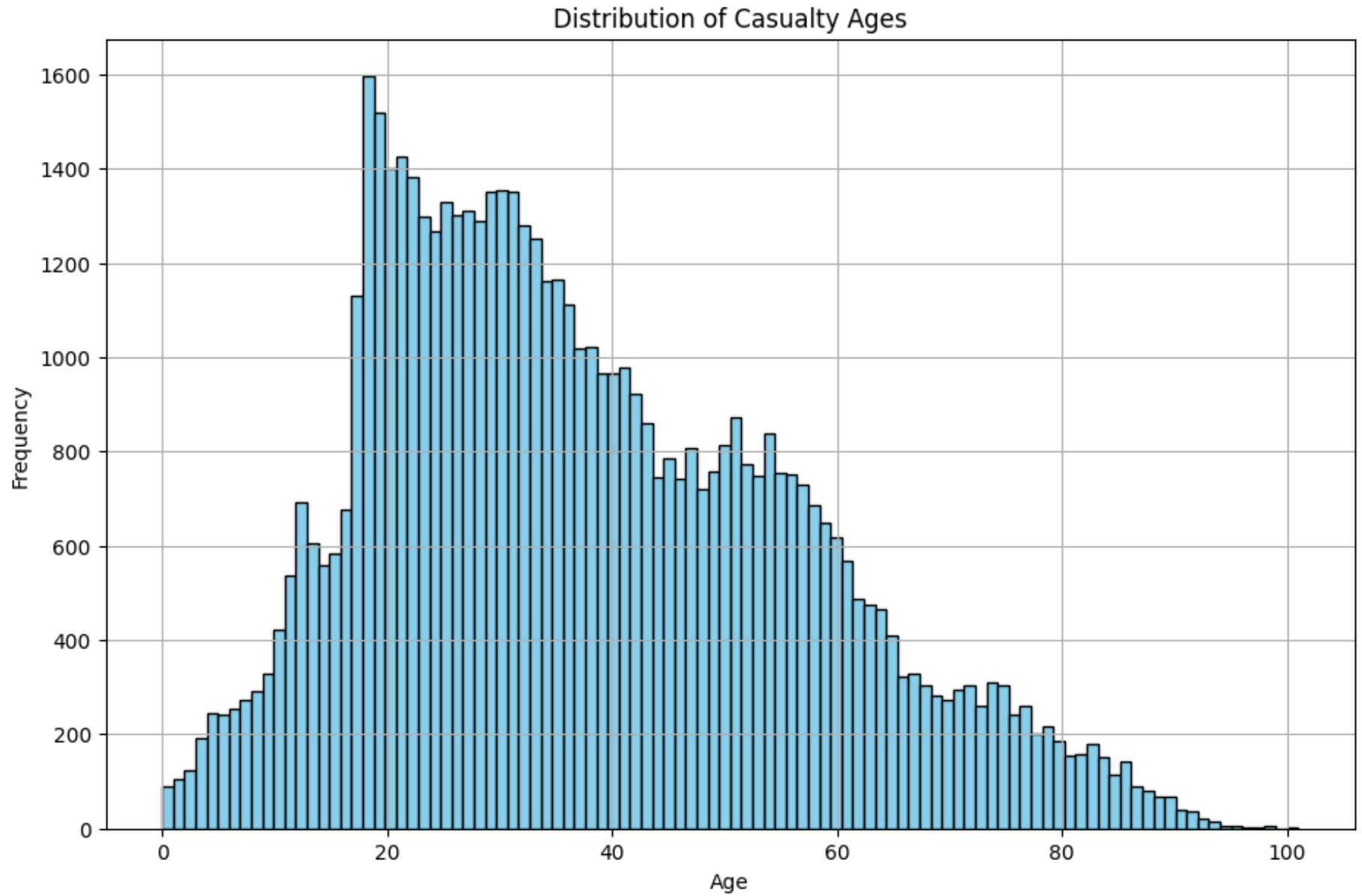
1. Cyclist
2. Motorcycle 50cc and under rider or passenger
3. Motorcycle 125cc and under rider or passenger
4. Motorcycle over 125cc and up to 500cc rider or passenger
5. Motorcycle over 500cc rider or passenger
8. Taxi/Private hire car occupant
9. Car occupant
10. Minibus (8 - 16 passenger seats) occupant
11. Bus or coach occupant (17 or more passenger seats)
16. Horse rider
17. Agricultural vehicle occupant
18. Tram occupant
19. Van / Goods vehicle (3.5 tonnes mgw or under) occupant
20. Goods vehicle (over 3.5t. and under 7.5t.) occupant
21. Goods vehicle (7.5 tonnes mgw and over) occupant
22. Mobility scooter rider
23. Electric motorcycle rider or passenger
90. Other vehicle occupant
97. Motorcycle - unknown cc rider or passenger
98. Goods vehicle (unknown weight) occupant
99. Unknown vehicle type (self rep only)
103. Motorcycle - Scooter (1979-1998)
104. Motorcycle (1979-1998)
105. Motorcycle - Combination (1979-1998)
106. Motorcycle over 125cc (1999-2004)
108. Taxi (excluding private hire cars) (1979-2004)
109. Car (including private hire cars) (1979-2004)
110. Minibus/Motor caravan (1979-1998)
113. Goods over 3.5 tonnes (1979-1998)

## 2 Patterns

- More than 1.5 times the casualties are male.

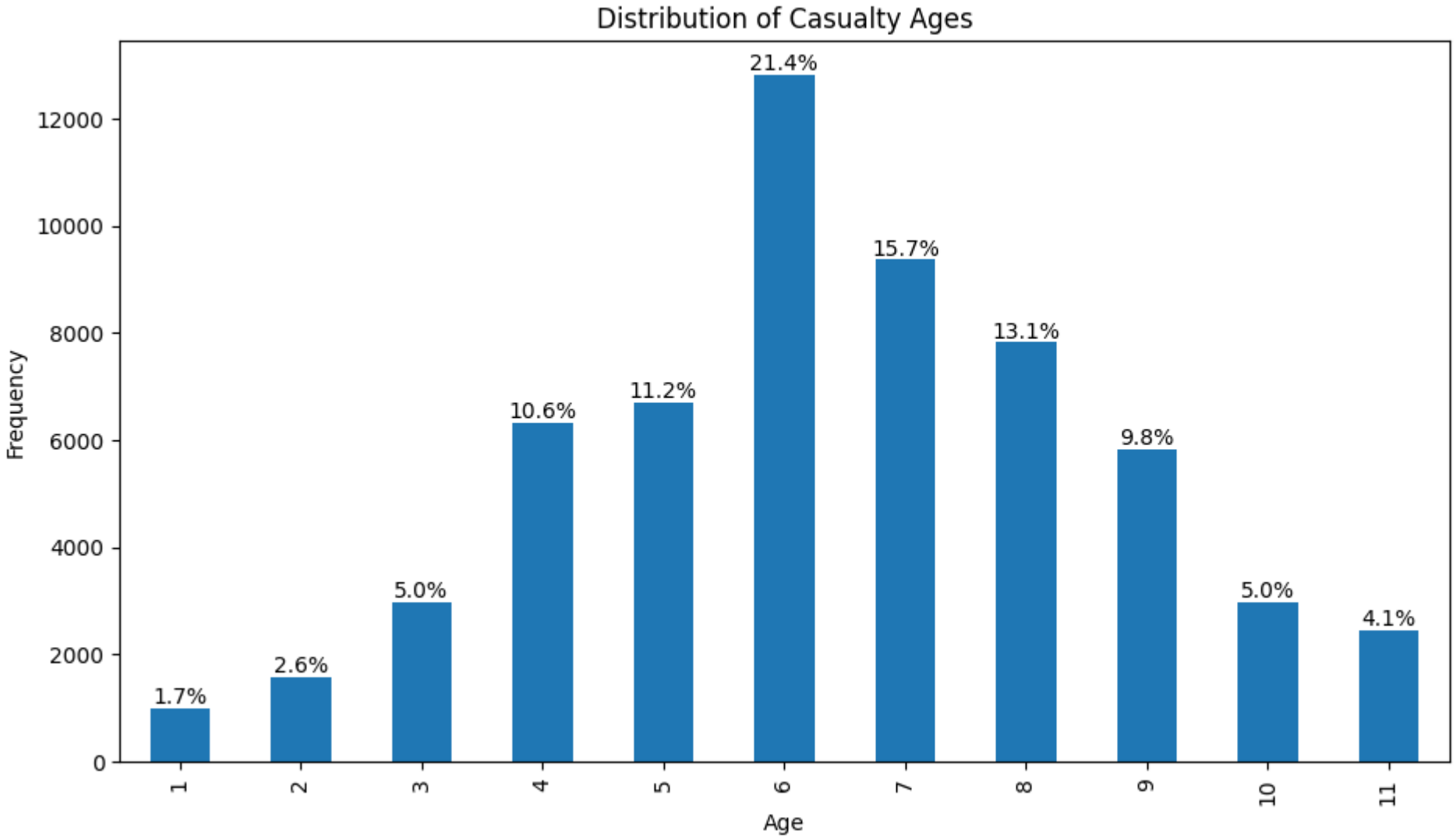


- According to the plot below, the majority of casualties are related to individuals aged 18.



# 2 Patterns

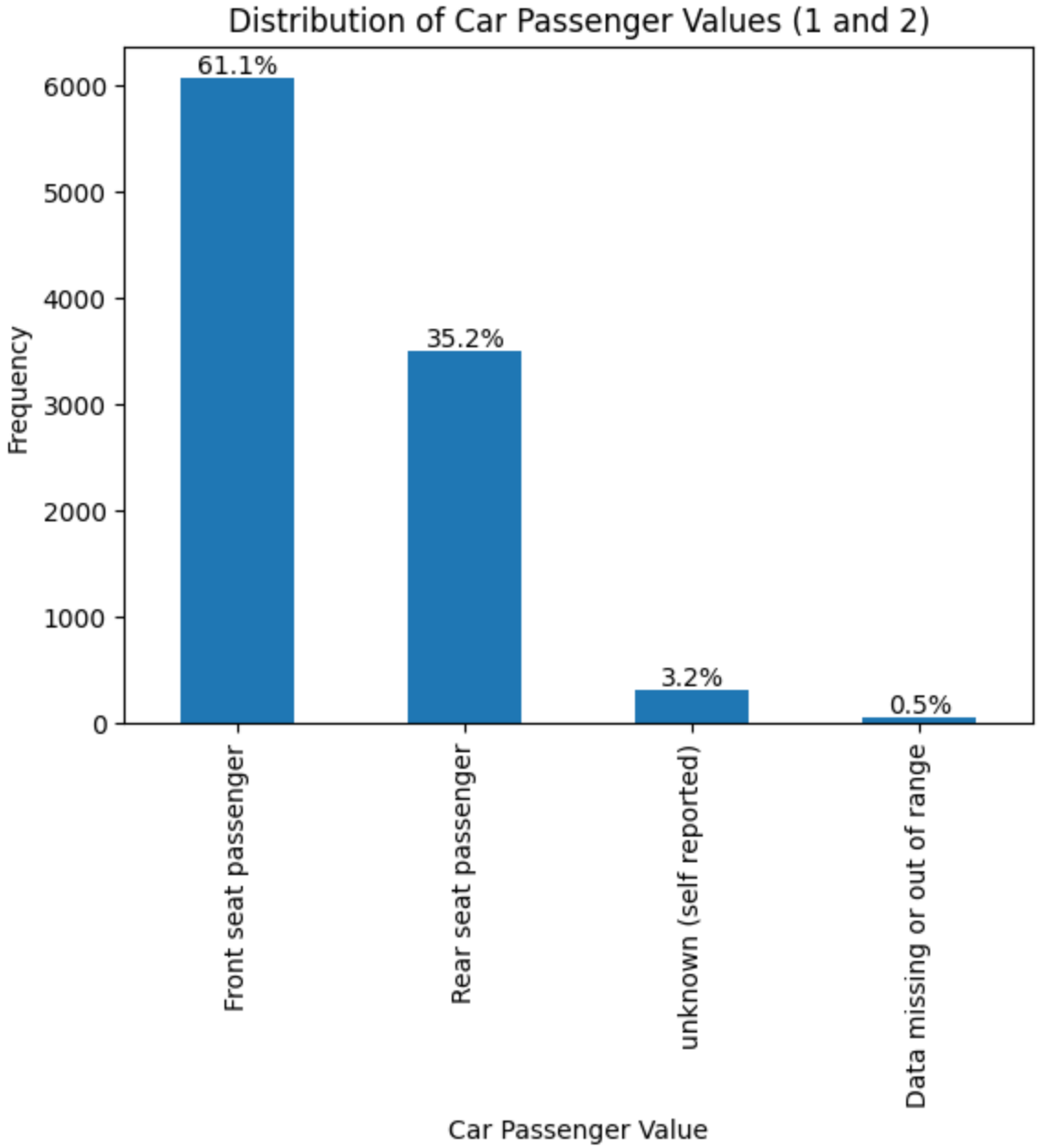
- But the majority of casualties are in the 6th age band.



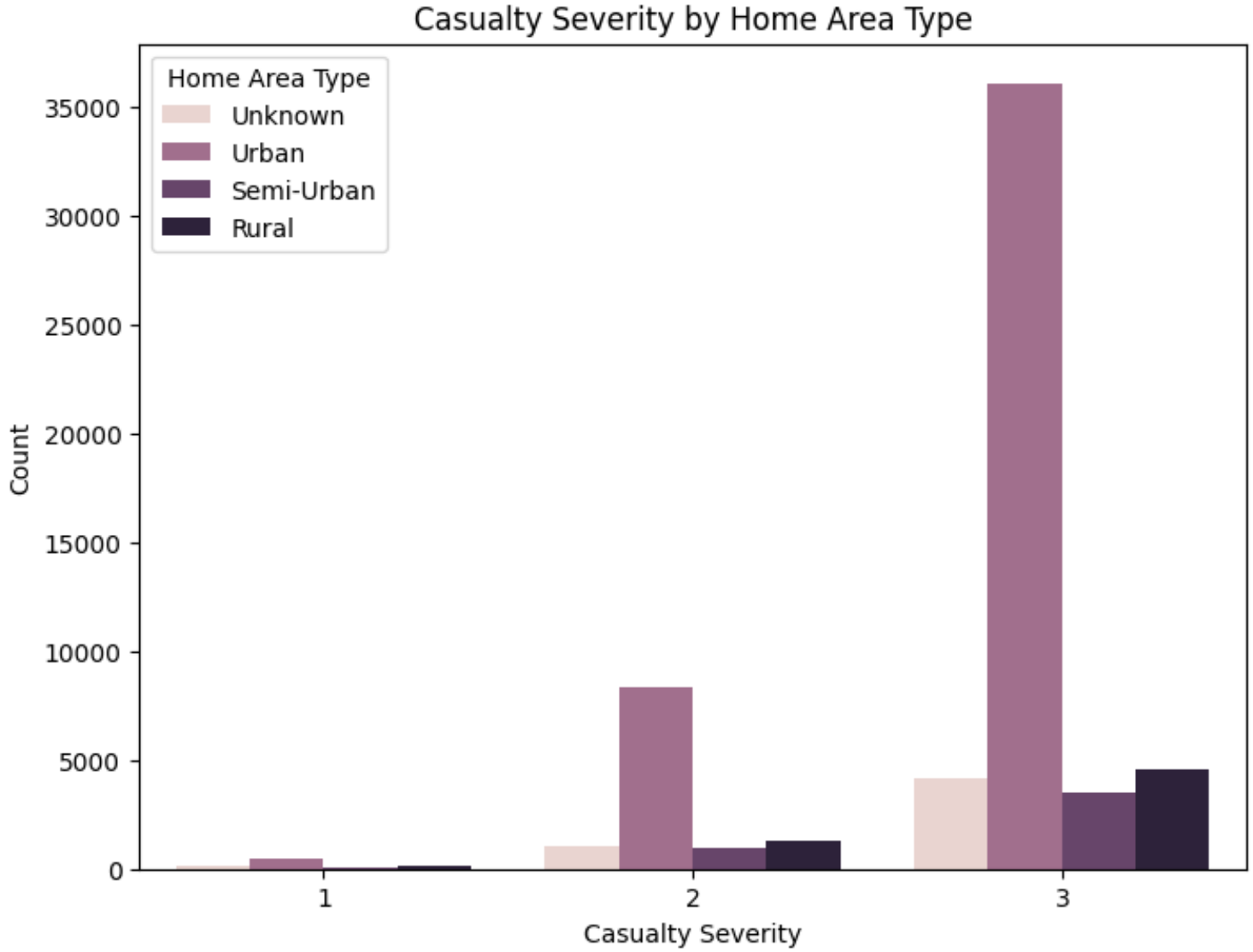

age band of calualties:
1. [0 - 5]
2. [6 - 10]
3. [11 - 15]
4. [16 - 20]
5. [21 - 25]
6. [26 - 35]
7. [36 - 45]
8. [46 - 55]
9. [56 - 65]
10. [66 - 75]
11. Over 75

## 2 Patterns

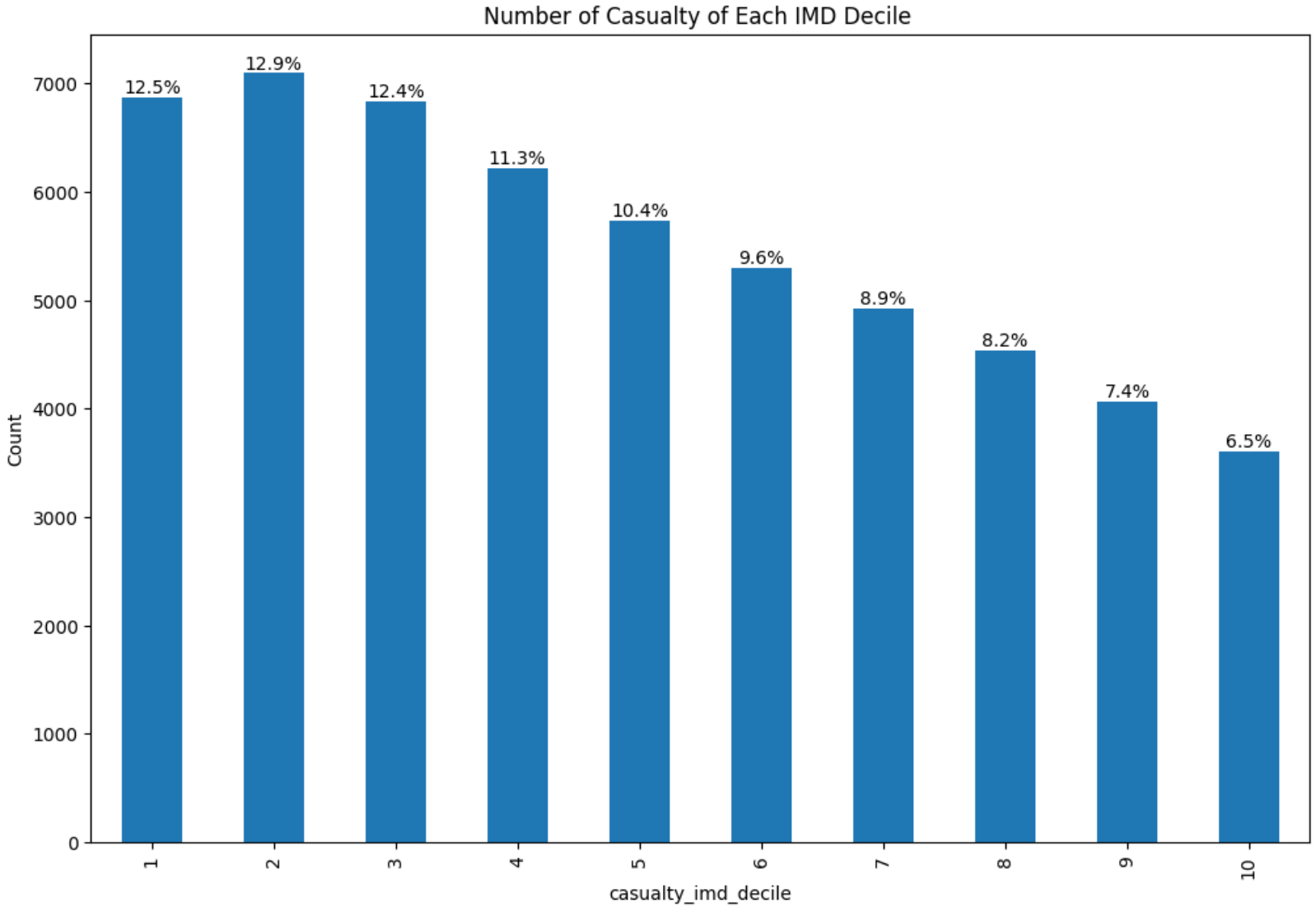
- According to the plot below, front-seat passengers are the most frequently injured. However, without knowing whether the cars involved in the accidents had any specific type of passenger, we cannot perform any further analysis.



- If we plot the number of casualties in different home area types for different casualty classes, we observe that the highest number of casualties in each casualty class is related to urban areas first, followed by rural areas.



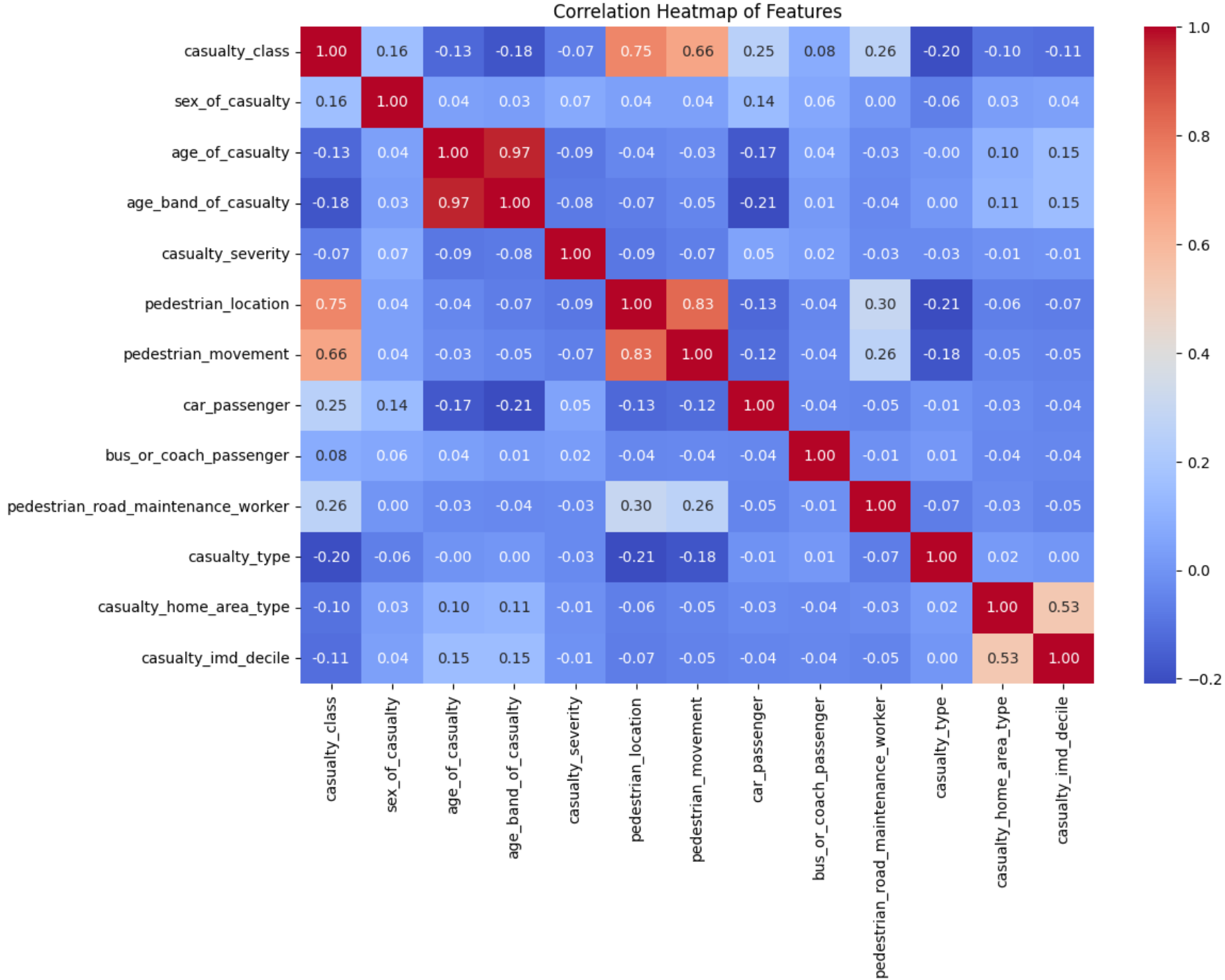
- The following plot displays the IMD decile of the area where the casualty resides. However, due to a lack of data regarding the number of populations in each IMD decile, further analysis is limited.



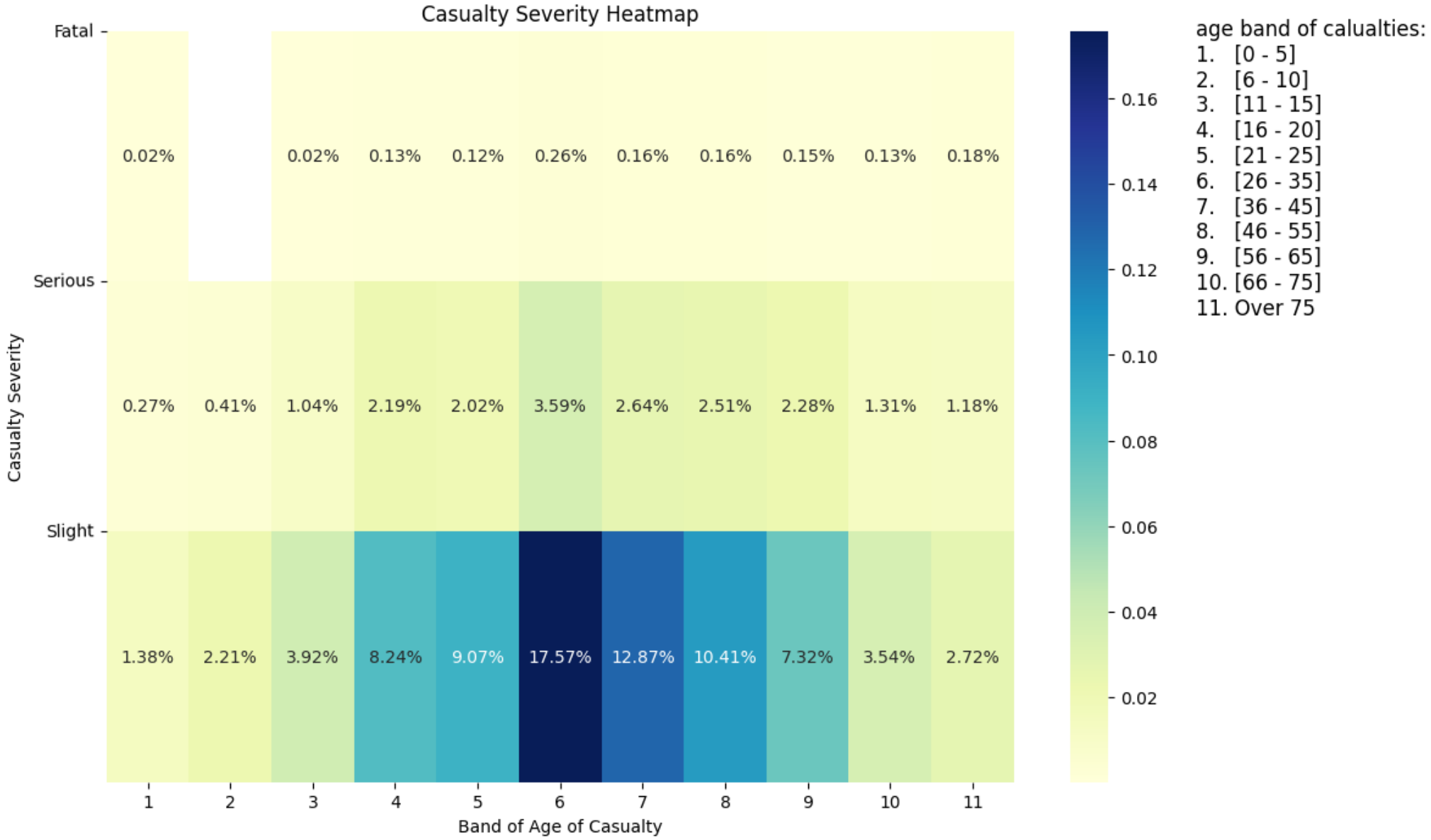

IMD decile:
1. Most deprived 10%
2. More deprived 10-20%
3. More deprived 20-30%
4. More deprived 30-40%
5. More deprived 40-50%
6. Less deprived 40-50%
7. Less deprived 30-40%
8. Less deprived 20-30%
9. Less deprived 10-20%
10. Least deprived 10%

## 2 Patterns

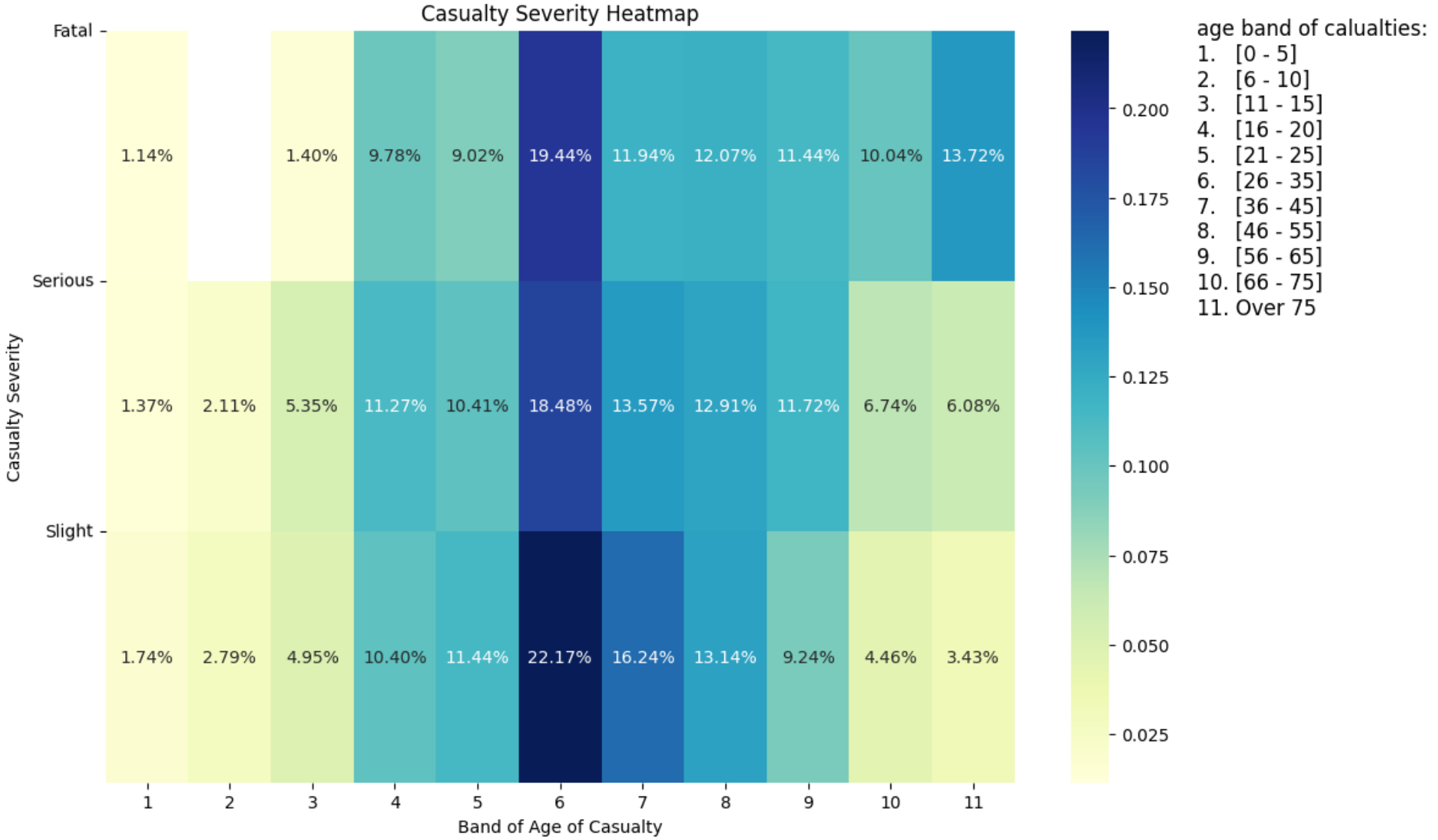
- Next, we proceed with a more complex analysis. In this step, we employ a heatmap to describe the relationship between the number of casualties and two different parameters. The plot below illustrates the correlation of each parameter with other parameters in the columns.


Correlation Heatmap of Features
casualty_class 1.00 0.16 -0.13 -0.18 -0.07 0.75 0.66 0.25 0.08 0.26 -0.20 -0.10 -0.11
sex_of_casualty 0.16 1.00 0.04 0.03 0.07 0.04 0.04 0.14 0.06 0.00 -0.06 0.03 0.04
age_of_casualty -0.13 0.04 1.00 0.97 -0.09 -0.04 -0.03 -0.17 0.04 -0.03 -0.00 0.10 0.15
age_band_of_casualty -0.18 0.03 0.97 1.00 -0.08 -0.07 -0.05 -0.21 0.01 -0.04 0.00 0.11 0.15
casualty_severity -0.07 0.07 -0.09 -0.08 1.00 -0.09 -0.07 0.05 0.02 -0.03 -0.03 -0.01 -0.01
pedestrian_location 0.75 0.04 -0.04 -0.07 -0.09 1.00 0.83 -0.13 -0.04 0.30 -0.21 -0.06 -0.07
pedestrian_movement 0.66 0.04 -0.03 -0.05 -0.07 0.83 1.00 -0.12 -0.04 0.26 -0.18 -0.05 -0.05
car_passenger 0.25 0.14 -0.17 -0.21 0.05 -0.13 -0.12 1.00 -0.04 -0.05 -0.01 -0.03 -0.04
bus_or_coach_passenger 0.08 0.06 0.04 0.01 0.02 -0.04 -0.04 -0.04 1.00 -0.01 0.01 -0.04 -0.04
pedestrian_road_maintenance_worker 0.26 0.00 -0.03 -0.04 -0.03 0.30 0.26 -0.05 -0.01 1.00 -0.07 -0.03 -0.05
casualty_type -0.20 -0.06 -0.00 0.00 -0.03 -0.21 -0.18 -0.01 0.01 -0.07 1.00 0.02 0.00
casualty_home_area_type -0.10 0.03 0.10 0.11 -0.01 -0.06 -0.05 -0.03 -0.04 -0.03 0.02 1.00 0.53
casualty_imd_decile -0.11 0.04 0.15 0.15 -0.01 -0.07 -0.05 -0.04 -0.04 -0.05 0.00 0.53 1.00
casualty_class
sex_of_casualty
age_of_casualty
age_band_of_casualty
casualty_severity
pedestrian_location
pedestrian_movement
car_passenger
bus_or_coach_passenger
pedestrian_road_maintenance_worker
casualty_type
casualty_home_area_type
casualty_imd_decile
1.0
0.8
0.6
0.4
0.2
0.0
−0.2

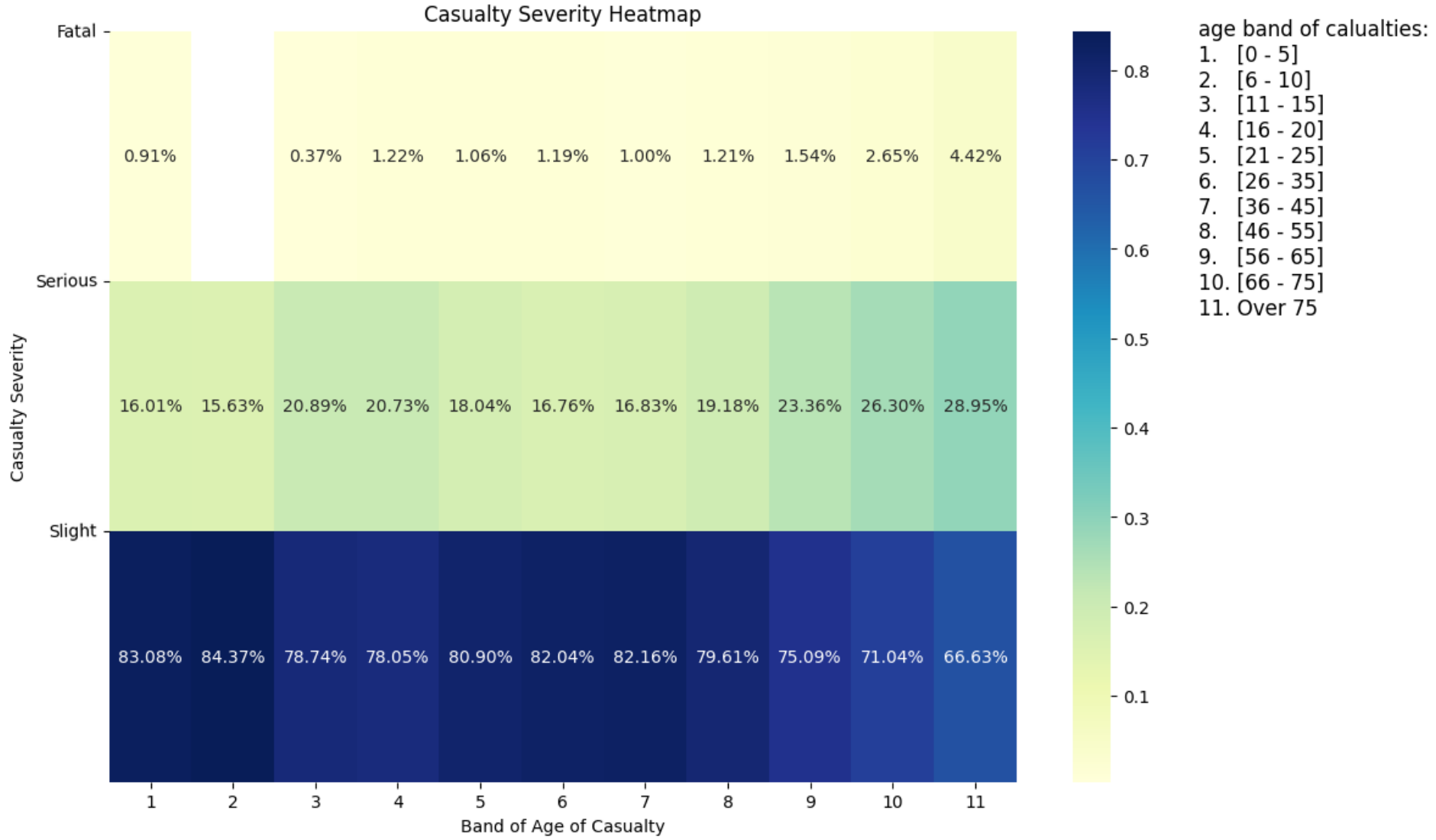
- In the plot below, we can observe the general relationship between the number of casualties, casualty severity, and the age of casualties.



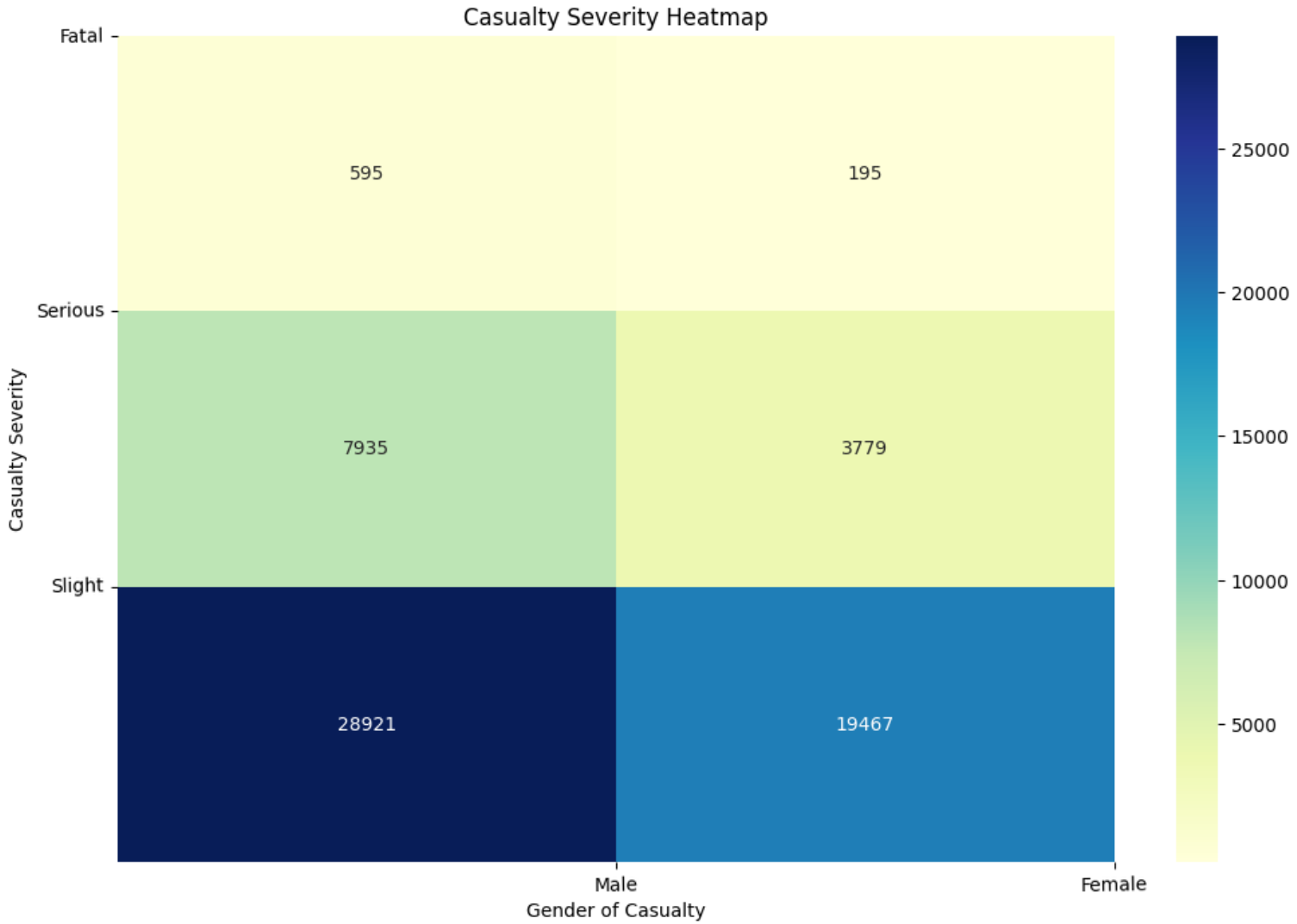
- In another view of the last plot, we can observe the most common age bands of casualties for each type of casualty severity. For example, fatal casualties consist of more people aged over 66 years old than other casualty severities.



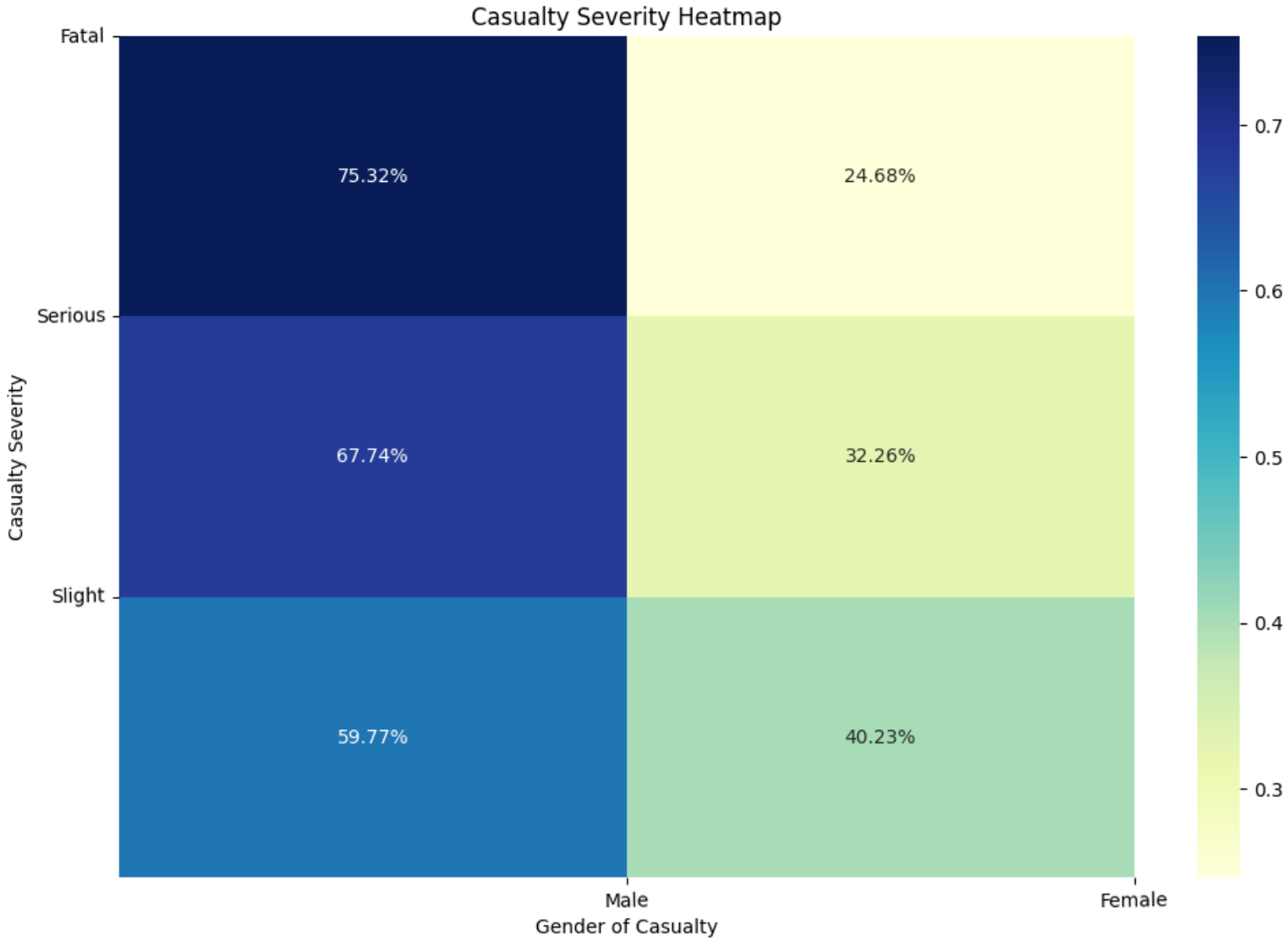
- Alternatively, in another plot of this type, we can observe the percentage of each type of casualty within each age band of casualties. We may notice a consistent pattern across all age bands of casualties.



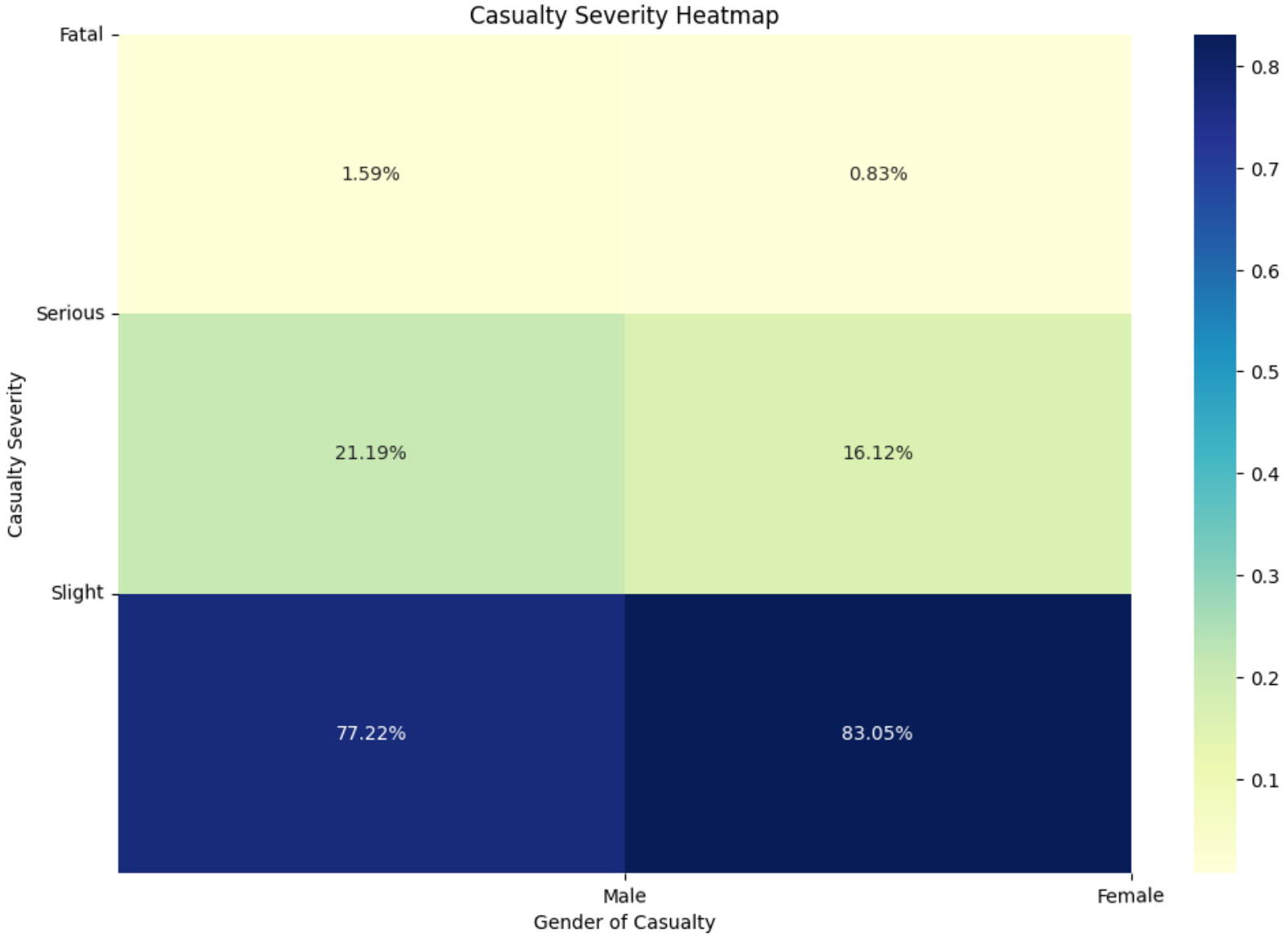
- In these three slides, we can observe the same analysis as before using a heatmap, but in this step, we compare different genders. The majority of casualties are male, and their injuries tend to be slight.



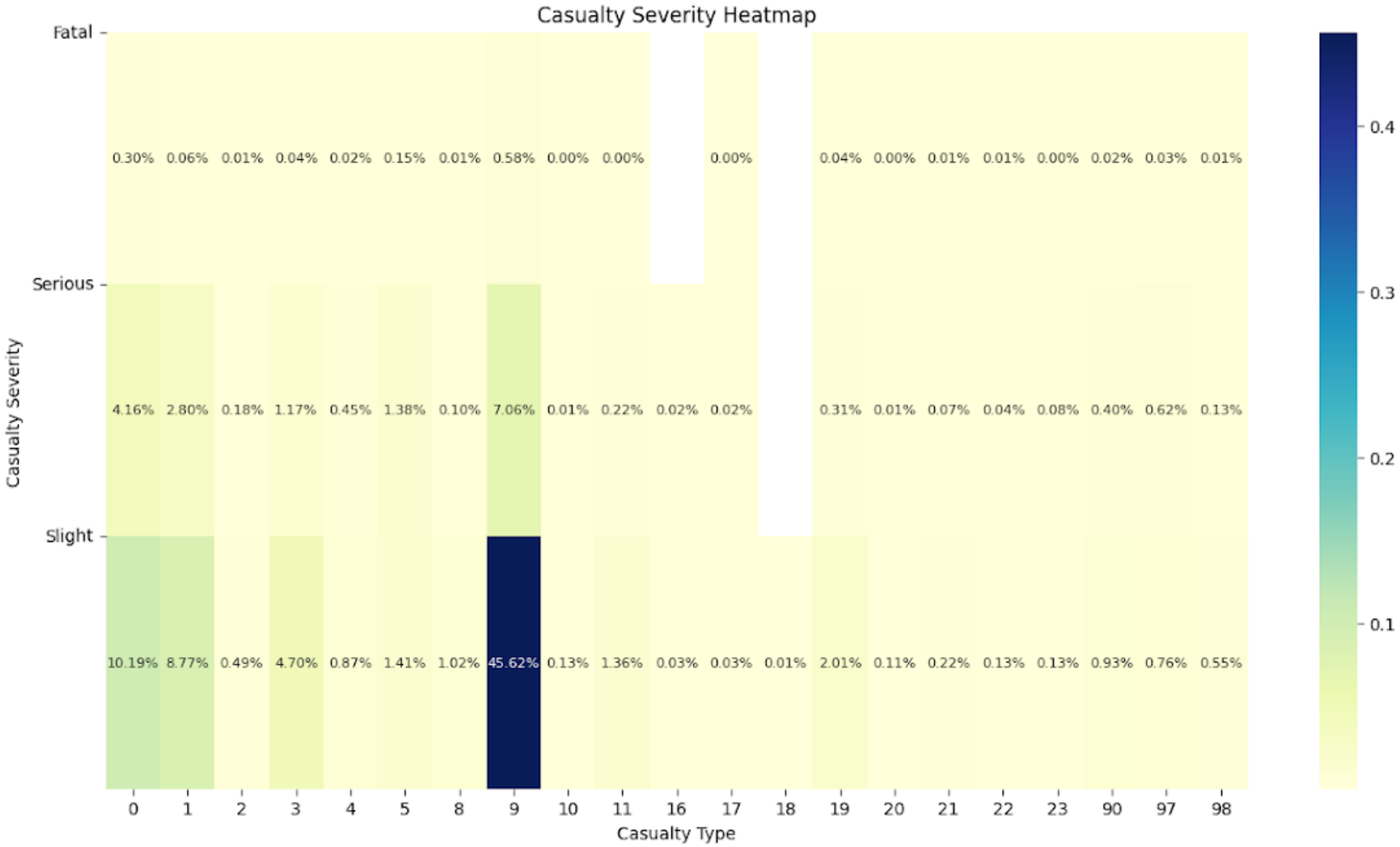
- In the following plot, we can observe which gender most of the casualties of each type belong to.



- The result of the following plot indicates that females have fewer fatal casualties than males.

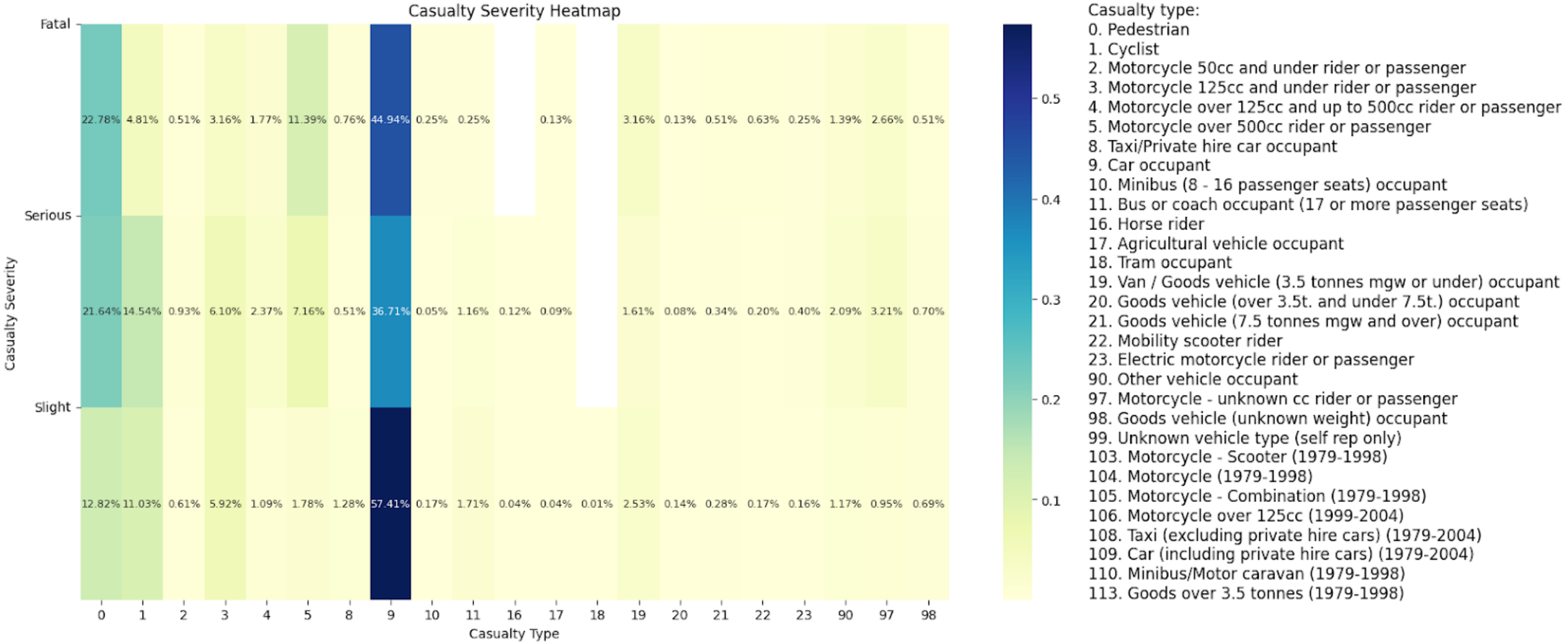


- Like the previous heatmap, we can conduct the same analysis for casualty severity and casualty type. In the following heatmap plot, we can observe that the majority of casualties are car occupants and have slight casualties.

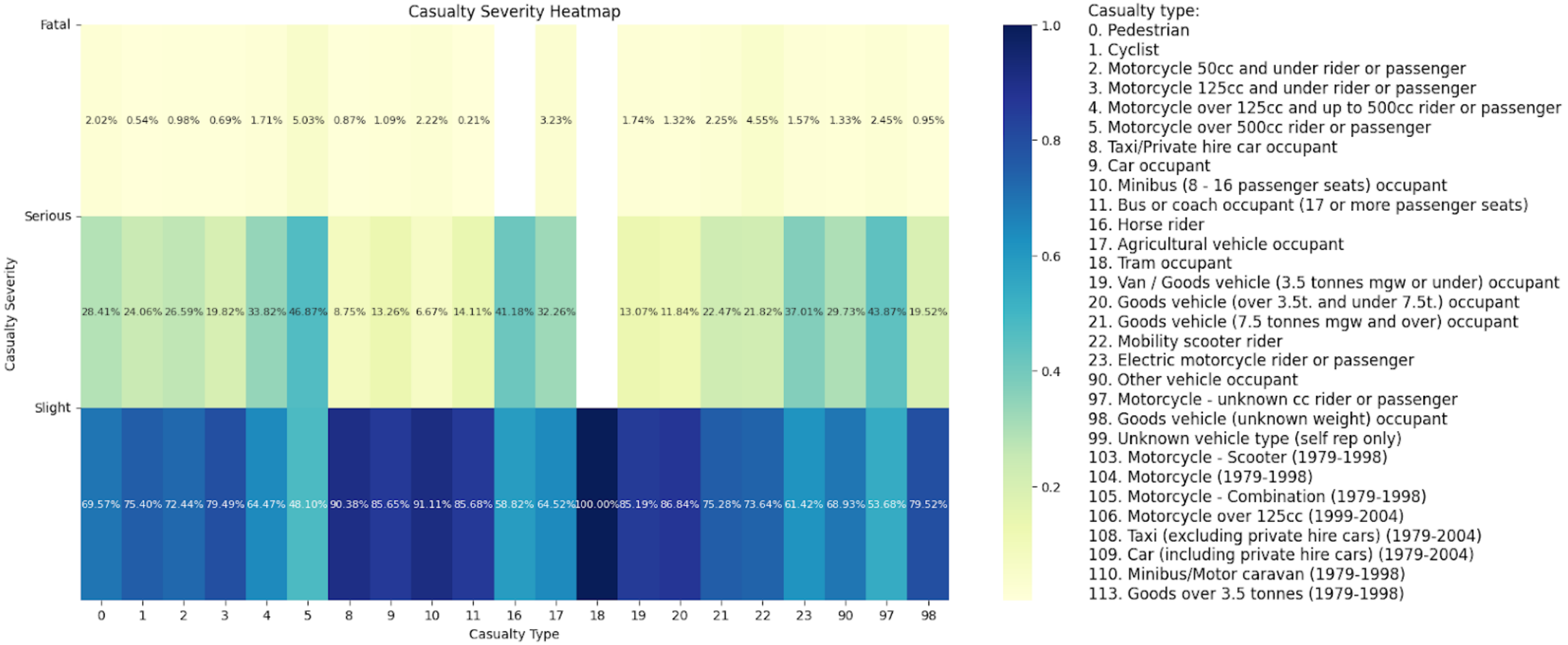



Casualty type:
0. Pedestrian
1. Cyclist
2. Motorcycle 50cc and under rider or passenger
3. Motorcycle 125cc and under rider or passenger
4. Motorcycle over 125cc and up to 500cc rider or passenger
5. Motorcycle over 500cc rider or passenger
8. Taxi/Private hire car occupant
9. Car occupant
10. Minibus (8 - 16 passenger seats) occupant
11. Bus or coach occupant (17 or more passenger seats)
16. Horse rider
17. Agricultural vehicle occupant
18. Tram occupant
19. Van / Goods vehicle (3.5 tonnes mgw or under) occupant
20. Goods vehicle (over 3.5t. and under 7.5t.) occupant
21. Goods vehicle (7.5 tonnes mgw and over) occupant
22. Mobility scooter rider
23. Electric motorcycle rider or passenger
90. Other vehicle occupant
97. Motorcycle - unknown cc rider or passenger
98. Goods vehicle (unknown weight) occupant
99. Unknown vehicle type (self rep only)
103. Motorcycle - Scooter (1979-1998)
104. Motorcycle (1979-1998)
105. Motorcycle - Combination (1979-1998)
106. Motorcycle over 125cc (1999-2004)
108. Taxi (excluding private hire cars) (1979-2004)
109. Car (including private hire cars) (1979-2004)
110. Minibus/Motor caravan (1979-1998)
113. Goods over 3.5 tonnes (1979-1998)

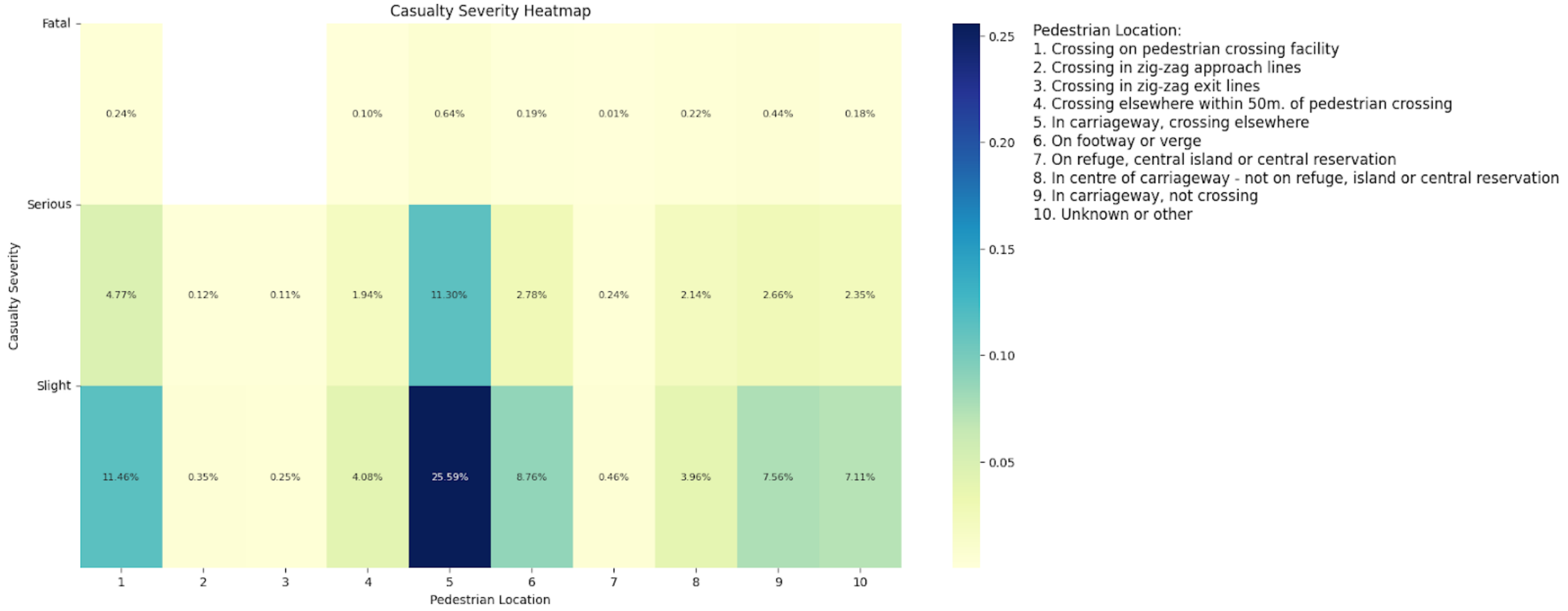
- From the following result, we can conclude that "car occupant," "pedestrian," and "Motorcycle over 500cc rider or passenger" are the main fatal casualties, respectively. However, cyclist casualties rank third in terms of slight casualties.



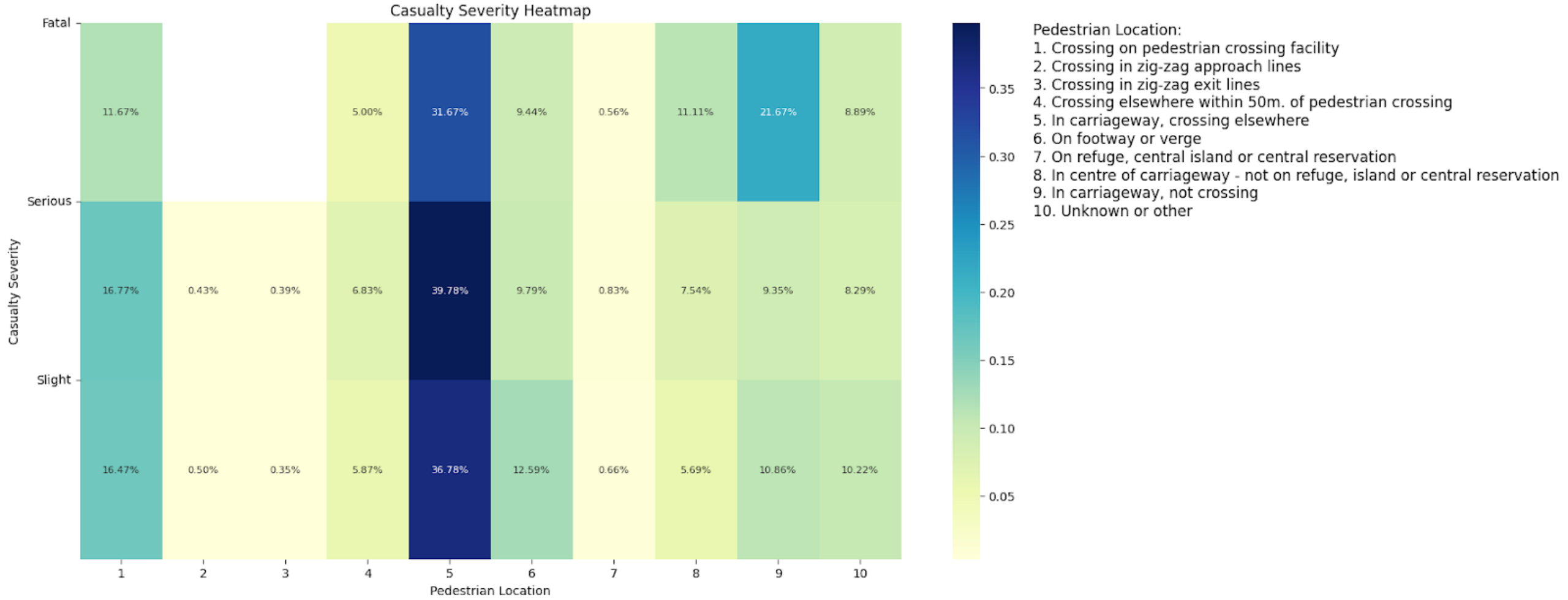
- The heatmap below shows that "minibus," "Taxi/Private hire car occupant," and "Goods vehicle (over 3.5t. and under 7.5t.) occupant" have the minimum serious casualties, respectively. However, in contrast, motorcycles have the maximum serious casualties compared to other casualty types.



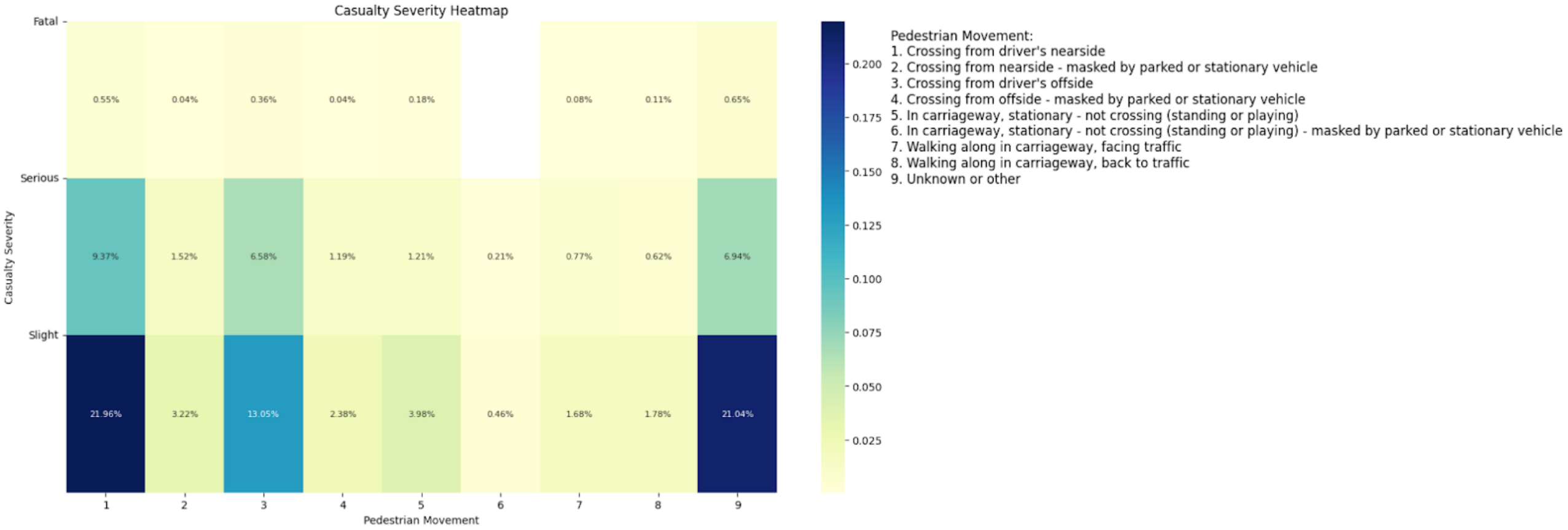
- The heatmap of pedestrian locations shows that "In carriageway, crossing elsewhere" has the greatest number of casualties; however, these casualties belong to the slight casualty class.



- The majority of fatal casualties belong to "In carriageway, crossing elsewhere" and "In carriageway, not crossing," respectively. However, "Crossing on pedestrian crossing facility" has the second most serious casualties. Conversely, "Crossing in zig-zag exit lines," "Crossing in zig-zag approach lines," and "On refuge, central island, or central reservation" have the minimum casualties of each type.



- For pedestrian movement, we observe that "Crossing from driver's nearside" has the maximum number of casualties of the slight type in the first position, followed by "Crossing from driver's offside" in the second position.



# 1 Solutions

- If people use public transport (such as taxis or minibuses) the injuries will not be serious in the event of an accident

- Since accidents at pedestrian crossings have many injured people (the second rank), by increasing the fine in this area, this number can be reduced.