Network Analysis

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```r
### perpetrator data ————————————
detainees_perpetrator_cl ← detainees_perpetrator %>%
  dplyr::select(
    id = perp_id,
    syear = det_start_year,
    eyear = det_end_year,
    facility = perp_related_penal_facility,
    perp_nationality,
    related_detainee = det_id,
    perp_organisational_affiliation,
    perp_age_range,
    perp_rank,
    perp_affiliated_province,
    perp_type_of_penal_facility
  ) %>%
  separate_rows(facility, sep = "\\|") %>%
  mutate(
    id = gsub("perp-", "", id),
    time = purrr::map2(syear, eyear, ~ seq(.x, .y))
  ) %>%
  dplyr::select(id, time, facility, everything())

dyadsedge ← detainees_perpetrator_cl %>%
  unnest(time) %>%
  group_by(facility, time) %>%
  summarise(ids = list(id), .groups = "drop") %>%
  filter(lengths(ids) > 1) %>%
  mutate(dyads = map(ids, ~ combn(.x, 2, simplify = FALSE))) %>%
  unnest(dyads) %>%
  unnest_wider(dyads, names_sep = "_") %>%
  rename(from = dyads_1, to = dyads_2) %>%
  filter(from ≠ to) %>%
  dplyr::select(from, to, time, facility)
```

```r
dyads <- dyadsedge %>%
  group_by(from, to, facility) %>%
  summarise(
    weight = n(),
    time_range = paste0(min(time), "-", max(time)),
    .groups = "drop"
  ) %>%
  arrange(facility, from, to) # Arrange for better readability
```

```r
head(dyadsedge, 10)
```

```
# A tibble: 10 x 4
   from  to     time facility
   <chr> <chr> <int> <chr>
 1 A0861 A0391  2006 Chagang Provincial MPS Holding Centre (Manpo)
 2 A0861 A0823  2006 Chagang Provincial MPS Holding Centre (Manpo)
 3 A0861 A0822  2006 Chagang Provincial MPS Holding Centre (Manpo)
 4 A0861 A0817  2006 Chagang Provincial MPS Holding Centre (Manpo)
 5 A0391 A0823  2006 Chagang Provincial MPS Holding Centre (Manpo)
 6 A0391 A0822  2006 Chagang Provincial MPS Holding Centre (Manpo)
 7 A0391 A0817  2006 Chagang Provincial MPS Holding Centre (Manpo)
 8 A0823 A0822  2006 Chagang Provincial MPS Holding Centre (Manpo)
 9 A0823 A0817  2006 Chagang Provincial MPS Holding Centre (Manpo)
10 A0822 A0817  2006 Chagang Provincial MPS Holding Centre (Manpo)
```

```r
head(dyads, 10)
```

```
# A tibble: 10 x 5
   from  to    facility                                      weight time_range
   <chr> <chr> <chr>                                          <int> <chr>
 1 A0391 A0817 Chagang Provincial MPS Holding Centre (Manpo)    29 2006-2007
 2 A0391 A0822 Chagang Provincial MPS Holding Centre (Manpo)    30 2006-2007
 3 A0391 A0823 Chagang Provincial MPS Holding Centre (Manpo)    27 2006-2007
 4 A0391 A0861 Chagang Provincial MPS Holding Centre (Manpo)    22 2007-2007
 5 A0817 A0391 Chagang Provincial MPS Holding Centre (Manpo)    21 2007-2007
 6 A0817 A0822 Chagang Provincial MPS Holding Centre (Manpo)    22 2007-2007
 7 A0817 A0823 Chagang Provincial MPS Holding Centre (Manpo)    20 2007-2007
 8 A0817 A0861 Chagang Provincial MPS Holding Centre (Manpo)    22 2007-2007
 9 A0822 A0391 Chagang Provincial MPS Holding Centre (Manpo)    27 2007-2007
10 A0822 A0817 Chagang Provincial MPS Holding Centre (Manpo)    35 2006-2007
```

```r
g2 <- graph_from_data_frame(d = dyads, directed = FALSE)

vertex_degree <- igraph::degree(g2)

E(g2)$width <- log(E(g2)$weight) / 2
V(g2)$label <- ifelse(vertex_degree > 50, V(g2)$name, NA)
V(g2)$size=degree(g2)%>%log()/2
V(g2)$color <- ifelse(
  vertex_degree < 10,
  "gold",
  ifelse(
    vertex_degree < 25,
    "#7BBC53FF",
    ifelse(
      vertex_degree < 50,
      "#DE6736FF",
      "#67C1ECFF"
    )
  )
)

plot(g2,
     edge.arrow.size = 0.5,
     vertex.color = V(g2)$color,
     vertex.frame.color = "gray",
     vertex.label.color = "black",
     vertex.label.cex = .5,
     vertex.label.dist = 3,
     edge.curved = 0.5)
```