1 DATA SOURCES

- http://crtm.maps.arcgis.com/home/item.html?id=1a25440bf66f499bae2657ec7fb40144
- https://data.renfe.com/dataset/volumen-de-viajeros-por-franja-horaria-madrid

2 DATA PARSING

TIME STEP: I've used a steps of 1 minute.

TURNSTILES: Based on the number of "in" and "out" turnstiles per hour and per station, I have computed the "weight" of each station on each time step. With the information of turnstiles, I can also compute the weights of each line in the network.

TIME WEIGHT: Again, based on the total number of "in" and "out" passengers per hour, I can calculate the distribution of passengers in the time.

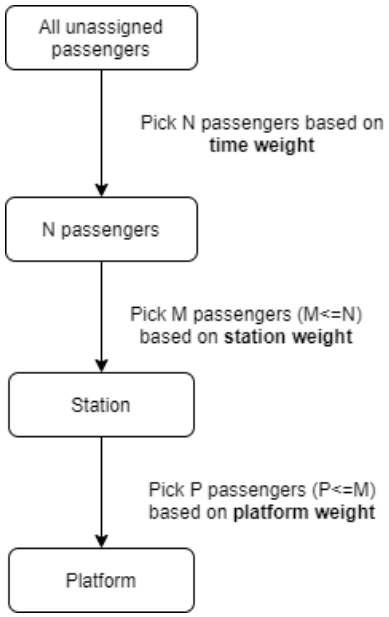
ROUTES: The routes gave me information about which stations must be connected. Then, I've simplified the file (I've removed the unnecessary columns and replace the station names).

Note: Each file contains two weights, IN and OUT, which represents how many passengers join and leave the network respectively.

3 FLOW

3.1 Flow of IN-passengers

On each time step, the passengers assignation as follows (depending on the IN-weight):



If there is a train in a platform (of a station), the passengers automatically move into the train.

3.2 Flow of OUT-passengers

Depending on the OUT-weight of a station in a specific time step, the passengers of a train may end the trip.

Also, if it is the end of the route, the passengers who still are in the train (i.e. the passengers who did not change to another platform) will be forced to end their trip.

3.3 Transfer to different line

If there are other platforms in the station (except the platforms of the line where the passenger comes from), then a passenger of a train may leave the train and go to a different platform.

The probability of stay in the train (or leave it) is based on the weight of each line in the network. Then, the probability to go to a platform is based on the weight of each platform in the station (again, except the platforms of the line where the passenger comes from).

3.4 Additional constraints

1. A passenger cannot be transfered or enter to a station if the next train departure is in more than 30 minutes. Note that this value may change depending on the network.

2. Some stations are not in the original data of routes, thus they were removed from the final network.

3. To get a better accuracy in the flow of passengers, we should use continuous distribution function instead. The function may be approximated by using interpolation methods.