

Vissum Corporación

Modelling Week 2012

Modelling the patients demand in Ophthalmological Clinics

Description of the problem:

We're interested in creating and discussing a mathematical model that would reflect the behaviour of patients visiting an ophthalmological clinic. This could facilitate the estimation of the future demand of consolidated patients and the efficient setting of the doctors agendas.

Patients may visit different clinics and different doctors in different departments, but they all follow almost the same procedures. The first time they visit the clinic they follow a **First Visit** protocol. Afterwards, and depending on the pathology and the results of the visit, the patient might proceed to a surgery process or just continue with the normal sequence of visits, with **3-month check-up**, **6-month check-up** and **year check-up**. Some patients drop out the process, others remain for years. Every type of visit has a different demand in time. A full description of the types of visits and their characteristics will be provided with the data.

Besides, there are new patients every month. This patients need the doctor's availability to be attended at the clinic the sooner the better and they will potentially demand clinic's resources in the future.

One of the difficulties of the problem is that the available historical data do not reflect exactly the patients demand, but its match with the agendas availability. In other words, data are affected by the past availability of the clinics agendas.

Working Plan:

- Create a mathematical model describing the new patients demand. Ideally, the model should offer an estimate of the demand in the future.
- Create a mathematical model for the behaviour of consolidated patients. This might be done using Markov Models.
- Using the developed models and simulation techniques, estimate a model for the aggregated demand month by month. This final model should allow the optimization of the doctors agendas.
- Identify the asymptotic behaviour of the demand. Analyse whether the patients demand is growing or, on the other hand, we've reached a stationary state, in order to decide whether or not new doctors should be recruited

Issues that should be taken into account.

Specific conditions of the data collection and internal organization of the clinics might pose some additional difficulties to the process:

The available data refer to different clinics, different departments and doctors, which could mean that models must be created independently.

Data correspond to a the match of the patients demand with the availability of the doctors, which means that data may have some bias. We know the date the appointment was made, which can shed light to understand the real demand, but we have no record on the historical circumstances that affected the process.