Consider the following scheduling problem: N_p teachers are supposed to have N_q classes in N_x class rooms at N_t time slots. The problem is to find a solution where all N_p teachers give a lecture to each of the N_q classes, using the available space-time slots with no conflicts in space (class rooms) or time. These are the **hard constraints** that have to be satisfied. In addition, one could imagine having a set of **soft constraints** like preferences in time slots, continuity in class-rooms, etc. This is of course just one example of a scheduling problem but we feel it is general and difficult enough to serve as a testbed for the neural network approach.

The basic entities of this problem can be represented by four sets consisting of N_p,N_q,N_x and N_t elements respectively. In what follows, we shall often use the notation $\vec{N} = (N_p, N_q, N_x, N_t)$ for the size parameters of a problem. One could then imagine formulating the problem in terms of neurons connecting two or more elements in different sets. However, there is a more transparent way to desribe the problem that naturally lends itself to the Potts neural encoding of ref. [3]. Consider **events**, defined by teacher-class pairs (p, q), to be mapped onto **space-time slots** (x, t) (see fig. 1). The hard constraints in this picture are as follows:

1. An event (p, q) should occupy precisely one space-time slot (x, t).
2. Different events (p_1, q_1) and (p_2, q_2) should not occupy the same space-time slot (x, t).
3. A teacher p should have at most one class at a time.
4. A class q should have at most one teacher at a time.

A schedule fulfilling all the hard constraints is said to be **legal**.

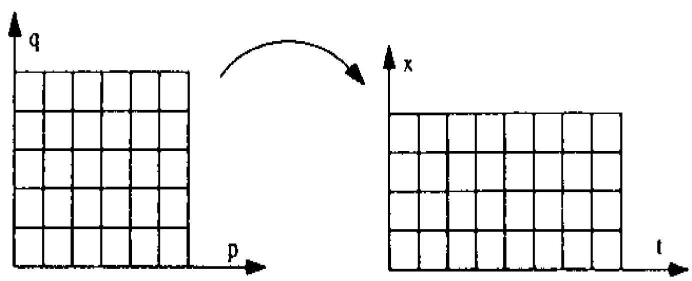

Figure 1: Mapping of events (p, q) onto space-time slots (x, t)