# Computer users activity analysis using recurrence plot

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Vast amounts of data about systems and users is gathered. This data can be analysed to get insight about behaviour of users and then to detect their traits. We decided to use non-linear methods to analyse gathered data because we assume that computer system is the non-linear one because of inter-program dependencies in current multi-program, multi-user operating systems.
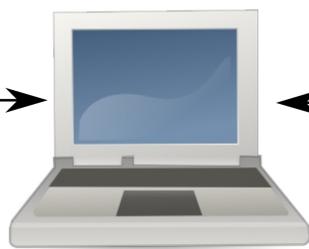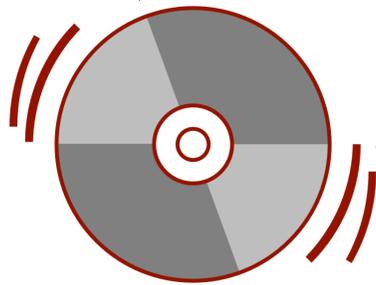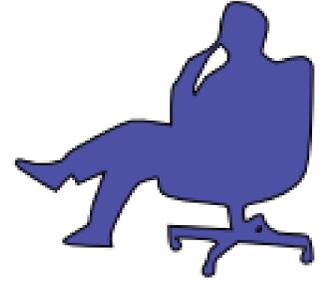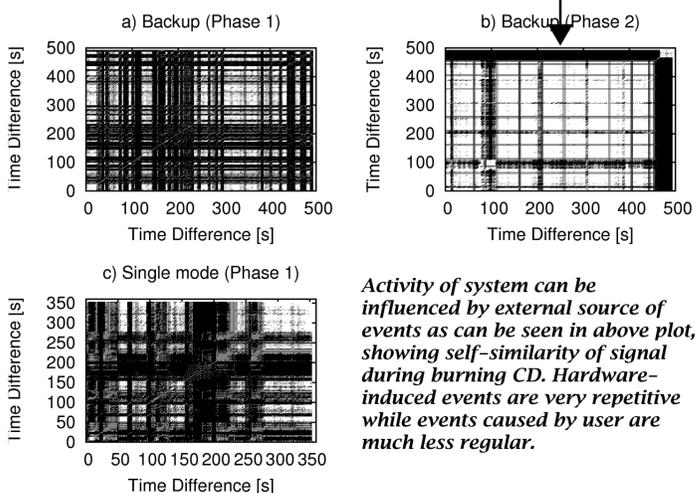
Linux with vmstat for data gathering

We chose number of interrupts per second as analysed variable because this value shows overall state of activity of entire system. We show that using recurrence plot can show some similarities in behaviour of system, and therefore can be used to detect similarities and differences in users behaviour.
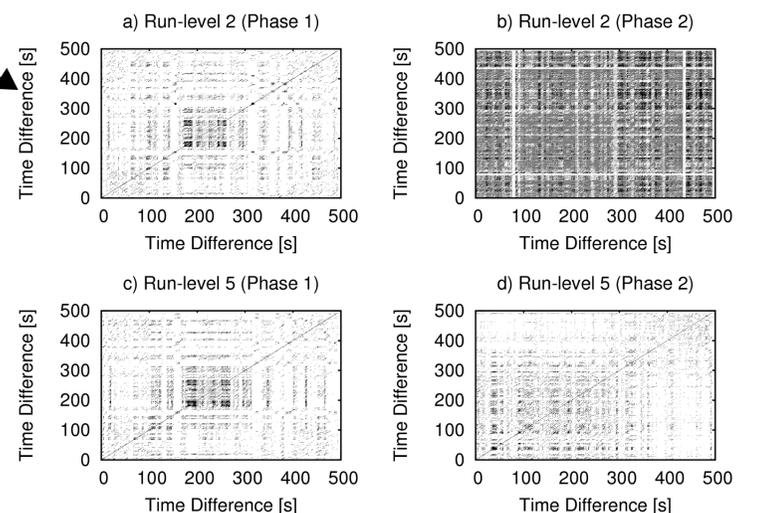
Number of context switches per second

FFT of signal
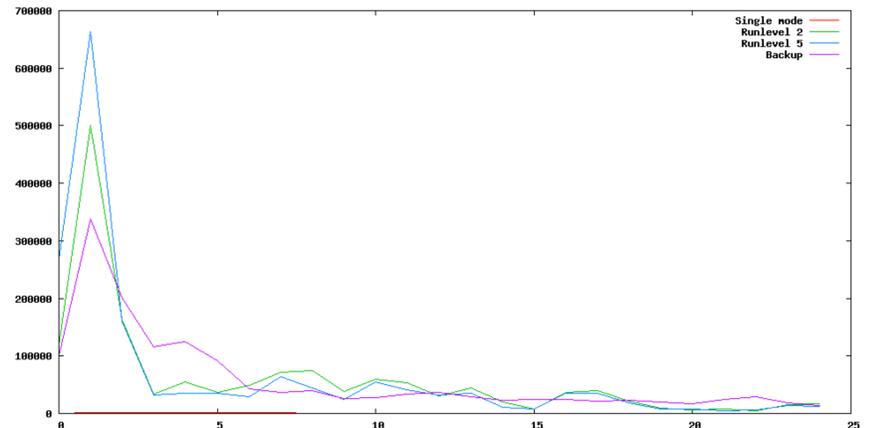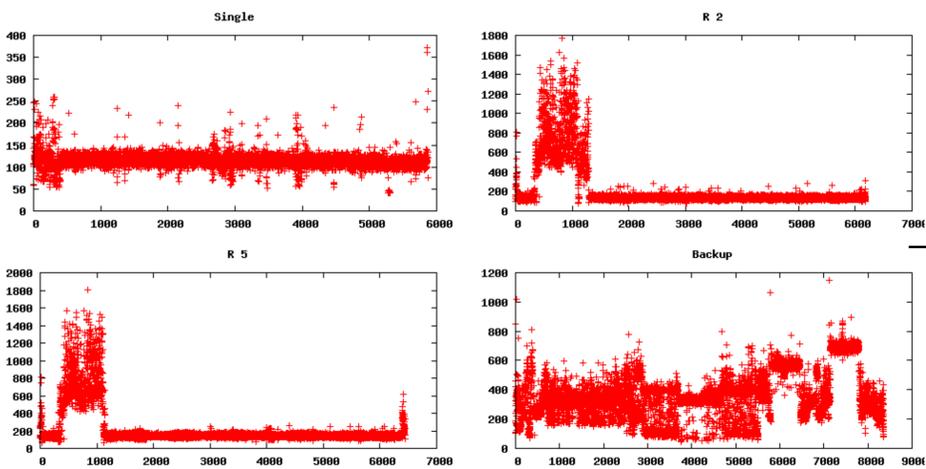
Recurrence plot of system during CD activity

System activity can be investigated and explained by using non-linear methods. Gathered data shows self-similarity when analysed using recurrence plots.

Recurrence plot of normal system

Activity of system can be influenced by external source of events as can be seen in above plot, showing self-similarity of signal during burning CD. Hardware-induced events are very repetitive while events caused by user are much less regular.

Running more processes introduces more variability to signal. But when entire system is busy running similar tasks signals are similar regardless of active run-level, as can be seen on left plots, which show signals from system with and without X-Window programs.

Any subtle differences disappear during system activity. Situation looks entirely different when system returns to idle state, as shown on right plots. They show the same system states after all maintenance jobs are done and system is not busy. Each of active programs runs with different speed and has different periods of activity which means that entire system is less regular, so different sets of active programs will show different characteristics.