The direct observation of cells over time using time-lapse microscopy can provide deep insights into many important biological processes. Reliable analyses of motility, proliferation, invasive potential or mortality of cells are essential to many studies involving live cell imaging and can aid in biomarker discovery and diagnostic decisions. Given the vast amount of image- and time-series data produced by modern microscopes, automated analysis is a key feature to capitalize the potential of time-lapse imaging devices. To provide fast and reproducible analyses of multiple aspects of cell behaviour, we developed TimeLapseAnalyzer. Apart from general purpose image enhancements and segmentation procedures, this extensible, self-contained, modular cross-platform package provides dedicated modalities for fast and reliable analysis of multi-target cell tracking, scratch wound healing analysis, cell counting and tube formation analysis in high throughput screening of live-cell experiments. TimeLapseAnalyzer is freely available (MATLAB, Open Source) at http://www.informatik.uni-ulm.de/ni/mitarbeiter/HKestler/tla.