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Subject Area	Software and Systems

Sketchagram

The multitouch diagram editor with sketch recognition

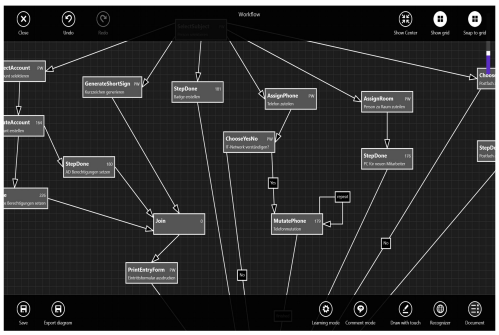
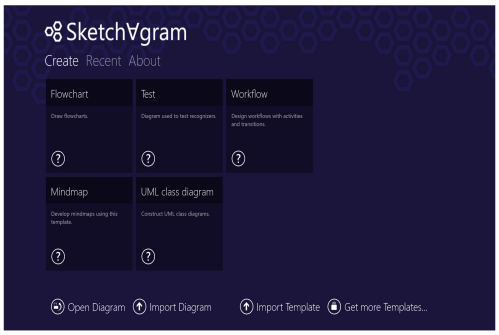
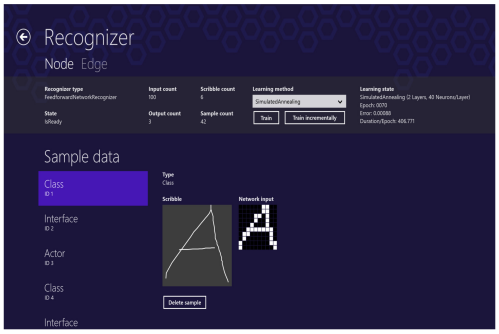


Diagram editor with a workflow diagram



Start screen with available diagram templates



Training data used for pattern recognition

Problem: Many people draw diagrams on paper to structure their ideas, but these sketches have then to be redrawn in an application to make them digitally accessible. To solve this problem we came up with the idea to create an application, which eliminates this tedious step in between by using pattern recognition. The drawn scribbles are thus directly transformed to well-drawn diagrams with a machine readable structure. The application should allow creating diagrams in various situations: on the couch, collaborative with a group of persons or on a desktop computer with a keyboard and a mouse.

Objective: The aim of this master thesis is to develop an application, which allows sketching diagrams using various input paradigms like multi-touch gestures, pen drawings and mouse interactions. This way, the application can be used on tablets and desktop computers as well. The application has to use pattern recognition algorithms and other techniques to predict the desired shape and to transform the drawn objects into predefined elements of the selected diagram template. During the project, there will be three main challenges: Firstly, to develop the best possible user interface for table and desktop computers, secondly, to implement a self-learning pattern recognition mechanism and, thirdly, to implement a framework, which permits defining various diagram types without extending the application itself.

Solution: The product of this master thesis is an application, which runs on all Windows 8 devices. To provide the best possible sketch recognition experience we tested and analyzed various pattern recognition techniques like fuzzy logic, self-organizing networks, neural networks and various learning algorithms, such as simulated annealing, backpropagation or genetic programming. To support the extension of the application there is a guide on how other developers can create new diagram templates. A diagram template is a XML file, which describes the appearance, data structure and other features of the diagram's available node and edge types. In addition, every diagram template can define import and export XSL transformations to support file types from other applications. Using the built-in store and custom repositories it is possible to simply buy and install additional diagram templates and update existing ones over the internet. With all these mentioned features, the application can be used in a very flexible manner and is suitable for various usage scenarios.