CogniPat Toolkit
Pattern Recognition Development Kit

Whether you have an embedded or data mining application, take advantage of your CogniMem evaluation board to learn, match and classify patterns, and make experiments practical by delivering accurate results at high speed. The learning of reference patterns can be made by writing them to the CogniMem chips as to standard memory cells or by using the model generator built into the cognitive memories which will automatically discard duplicates and decide if similar patterns represent novelty or not.

The CogniPat Toolkit interfaces seamlessly with the CogniMem evaluation boards featuring a single CM1K chip (i.e. 1024 neurons), 4 CM1K chips (i.e. 4096 neurons), and even stacks of chips with virtually unlimited capacity. In the event that your evaluation platform has insufficient capacity to hold the reference patterns, a simulation of the cognitive memories or neurons can be instantiated and sized accordingly. If such need occurs, please contact our customer support.

Features

- Input patterns can be derived from any type of discrete feature vectors as well as digital sensor outputs such as vibration, sound, signal, image, video, etc
- Build a knowledge base through supervised and unsupervised learning of reference patterns
- Exact or fuzzy matching of patterns against a knowledge base
    - K Nearest Neighbors, search, de-duplication
    - Anomaly and novelty detection, clustering, modeling
- Evaluate the size, throughput and accuracy of a knowledge
- Save and Restore of a knowledge base
- Single and batch operations
- Constant 1.3 microseconds recognition time per pattern

Content

The CogniPat Toolkit is delivered with the CogniMem evaluation boards and includes the following:

- C++ Dynamic Link Libraries
- Compatible with all the CogniMem evaluation boards
- Supported OS: Linux, Windows 7, XP, Vista
- Examples in C++, C# and MatLab

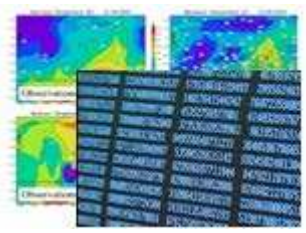

Image recognition
- Machine vision
- Target tracking
- Video monitoring
- Medical and satellite imaging
- Smart motion detection…

Signal recognition
- Speech recognition
- Voice identification
- Sonar, Radar identification
- EKG, EEG monitoring
- Vibration monitoring…

Data mining
- Genomics
- Fingerprint identification
- Unstructured data mining
- Cyber security
- Graphing…

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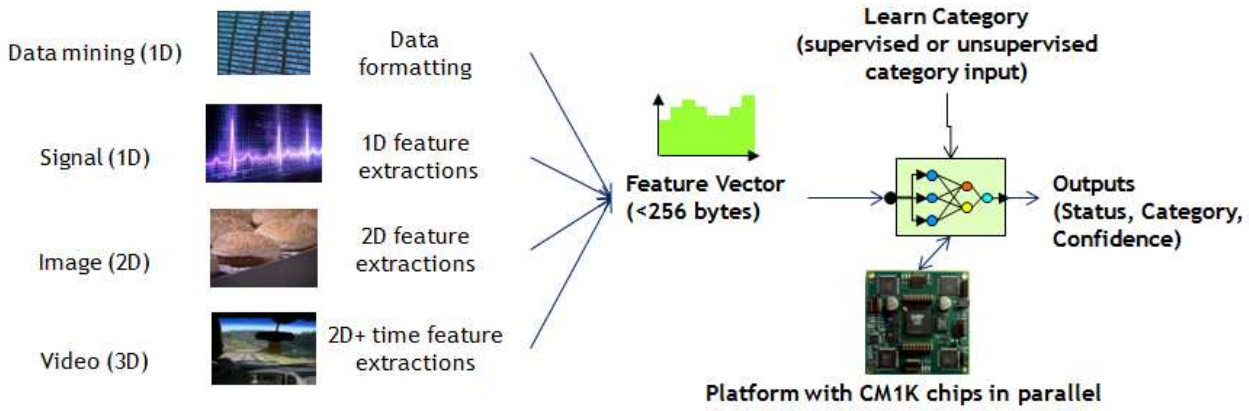

Using your preferred programming environment, take advantage of the CogniMem platform to match and classify patterns at high speed.

Patterns can be a combination of discrete measurements, samples from continuous functions, temporal sequences, series of pixels values, or more complex signatures extracted from source data.

Reference patterns can be loaded sequentially into the CogniMem chips as into a standard memory bank, or they can be learned using the model generator built into the cognitive memories or neurons. In the later case, the knowledge can be built with a variety of settings allowing to tune the similarity range, the segmentation of the network per context and more. Once a knowledge resides in the CogniMem chips, new patterns can be broadcasted and classified.

The speed of the learning and recognition operations make it affordable to run multiple tests to validate series of feature vectors, evaluate different settings for the building of the knowledge base and validate different decision making processes.

In the event that your hardware platform has insufficient capacity to hold the knowledge built by your application, a simulation of the neurons can be instantiated and sized accordingly. If such need occurs, please contact our customer support.

Input Data
- Vector patterns: Up to 256 bytes
- Categories: up to 32767 values
- Sub-networks: up to 127 context values

Output Data
- Classification status: Identified, Uncertain or Unknown
- Recognized category or categories in case of uncertainty
- Distance or confidence level per reported category
- Index to the firing cognitive memory cells or neurons

Exact Matching Functions
- K-Nearest Neighbor (KNN)
- Distance calculation: L1 or LSup distance norms
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Fuzzy Matching Functions
- Radial Basis Function (RBF)
- Distance calculation: L1 or LSup distance norms

Automatic Model Generator
- Knowledge built by learning vectors per category
- Settings to moderate conservatism or similarity domain
- Save/ Restore of the cognitive memory calls or neurons

CM1K features 1024 cognitive memories, or neurons, working in parallel and capable of learning and recognizing patterns of up to 256-bytes in a few microseconds. The parallel architecture of CM1K allows to daisy-chain many chips together to increase the size of the memory bank, or neural network, by increment of 1024. Its low pin-count and low power consumption make it an ideal companion

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chip for embedded and consumer systems. Its cascadability makes it an ideal candidate for large data mining systems.