

# Distributed Systems – Project Proposals

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## MPI

### Feature extraction technique - Hough transform – 2 students

The classical Hough Transform is a global method for finding straight lines hidden in larger amounts of data. In many cases an edge detector can be used as a pre-processing stage, one of the most common one being the Canny edge detector. However, due to imperfections in either the image data or the edge detector, there may be missing points or pixels in the resulting image. The purpose of the Hough transform is to address this problem by making it possible to perform groupings of edge points into object candidates by performing an explicit voting procedure over a set of parameterized image objects.

Starting from input images that are already pre-processed (see Figure 1 b)), develop an distributed algorithm for extracting the features of the image in a network presenting a connected graph topology. Use MPI for implementation. You are required to make extensive use of topologies, data-types and global operations. Your algorithm should balance the workload between processors together while minimizing communication and message size. As an output of the program execution you are required to output the Hough Space and the resulting features for the required value of the threshold (see Figure 1 c) and d)).

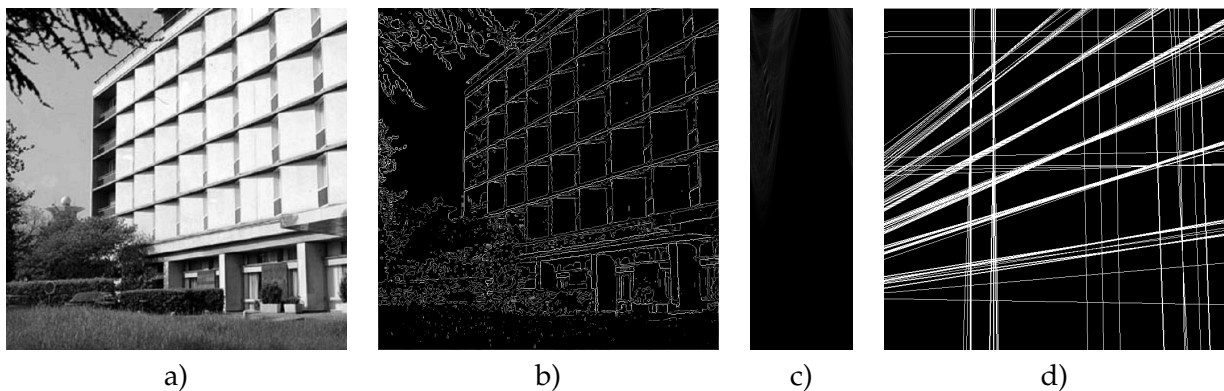


FIG. 1 – Classical Hough Transform

## JXTA

### Collaborative working – 2 students

Develop a distributed application that, once deployed on the target peers, allows efficient editing of the same text document at the same time. Once the secure authentication finishes, one of the teams will open a document. This document will be updated by all connected applications. Editing can then occur. Think of it as a SVN server where numerous commit/updates are performed by the members. Think of the problems that might appear. Try to reduce the costs in terms of message number and size for synchronizing the document. Use the JXTA framework for implementation.

### Chat application – 2 students

Develop a P2P chat application that meets the following requirements :

- allows secure authentication for the chat members
- allows conference mode : more than two chat members can be connected at the same time

Implement this using the JXTA framework. Think at the possible issues that might occur.

### File transfer application – 2-3 students

Develop a P2P application that allows efficient transfer of files among the file sharing members. The application will require secure authentication of the members. Each member will be able to select a list of files to be shared with the other members. The application will allow file share inspection and download. Use a distributed shared file index. Observe the convergence of the index across the peers present a high churn rate.

Use the JXTA framework for implementation. Justify the decisions you make.

### Distributed auctions – 2-3 students

Build a distributed peer-to-peer real-time on-line bidding system. By *distributed* we mean there is no central administrative authority that makes the comparisons, decisions, and one-by-one notifications. By *peer-to-peer* we mean that each participant has the same privilege, obligation, and responsibility in the bidding session. By *real-time* we mean that the updated bidding information can propagate to other nodes in a timely way. The main objective of this project is to design and implement a sample distributed application using JXTA.