

Modeling and Simulation of a Color Printer Pipeline

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Class Project : Final Presentation

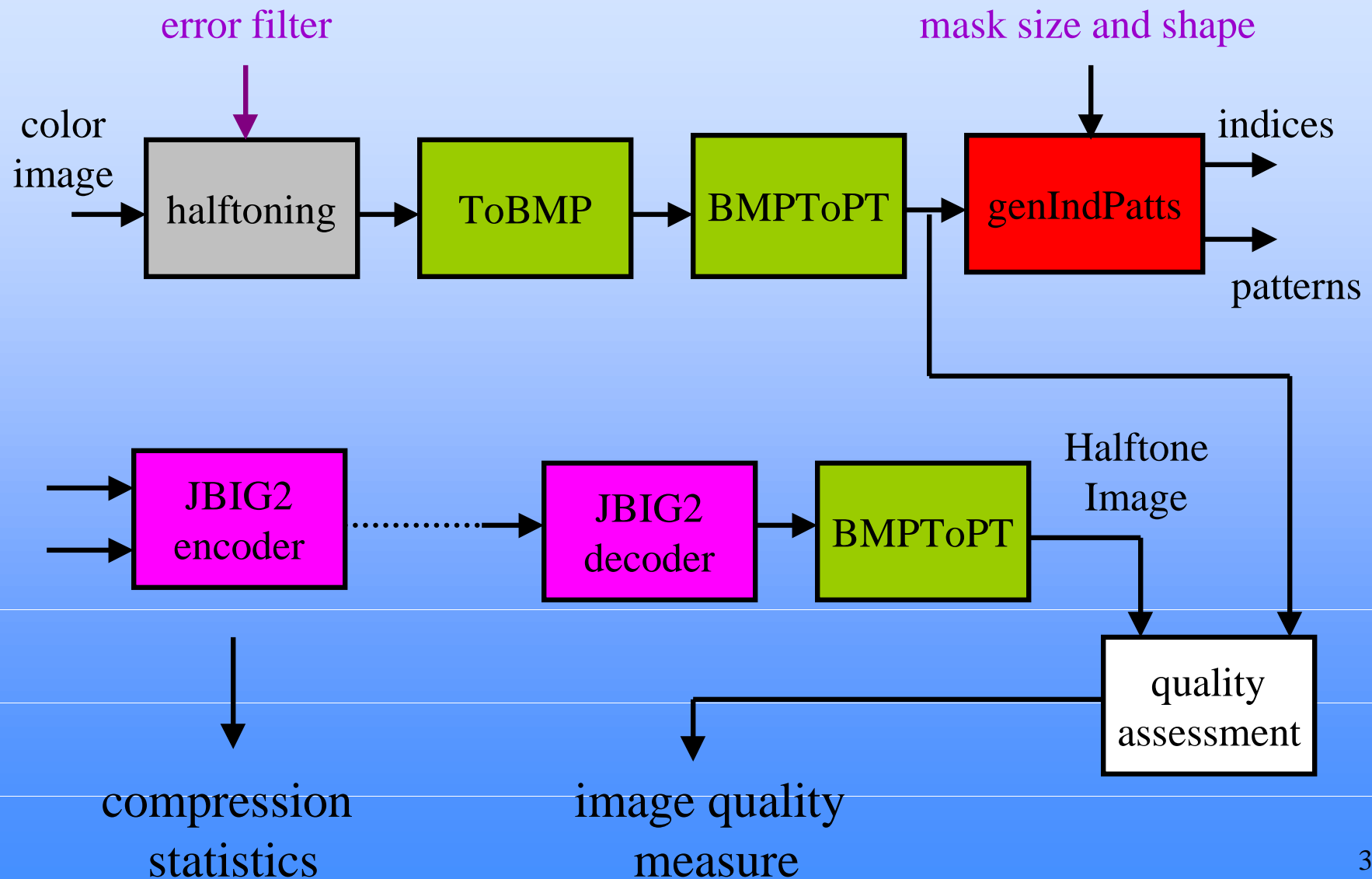
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Problem Statement

- Design a test platform for a color printer pipeline
 - vector color error diffusion halftoning
 - JBIG2 compliant encoding/decoding
 - report image quality and compressed file size tradeoff
- Features
 - user control of halftoning filter parameters
 - user control of JBIG2 encoder parameters
 - hardware/software partitioning of pipeline

Implementation of Color Printer Pipeline



Solution: Modeling in Ptolemy

- **Domain**
 - synchronous data flow (SDF)
- **Implementation**
 - stars in C++/C
 - MATLAB/C interface for generation of indices and patterns
- **Features**
 - JBIG2 compatible
 - encoder and halftoning optimizations possible
 - BMP file generation utilities
 - comprehensive compression statistics and quality evaluation
 - efficient partitioning of blocks into hardware and software

Sample Results: Original halftone



Sample Results: Reconstructed halftone



Sample Results: Statistics

- **Compression statistics**
 - number of patterns = 5
 - mask size=2x2
 - mask shape=square
 - pattern dictionary (0000,0001,0101,0111,1111)
 - compression ratio of red plane=3.1768
 - compression ratio of green plane=3.1546
 - compression ratio of blue plane=3.3748
 - total compression ratio = 3.2325
 - percentage filesize due to dictionary=0.12%
- **Quality measure**
 - weighted signal to noise ratio=24.65dB

Conclusions: Deliverables

- A design test and synthesis platform for a JBIG2 compliant color printer pipeline
 - written in Ptolemy
 - Ptolemy dataflow programming
 - Ptolemy code generation
 - Ptolemy GUI
 - enable interactive user optimization of pipeline parameters
 - MATLAB
 - C