



KT-Tech Incorporated

KT-Tech's Medical and Healthcare Software Applications

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KT-Tech: Healthcare Market

PROBLEM:

- Federal Mandate: The Government is requiring healthcare providers to establish electronic medical record (EMR) and electronic health record (EHR) systems by 2015 or face significant fines.
- ❖ Medical imagery will consume the majority of the storage space, time and cost to produce, store, transmit and display these EMR and EHR digital records.
- ❖ Medical image quality continues to increase thereby increasing the original image size. The average size of a medical image is approaching 500 MB (2012)
- ❑ Digital pathology (DP) imagery (images of tissue slides) is the fastest growing segment in the digitized image archive sector.
 - DP images have high resolution and each image size can vary from 0.5 GB (500 MB) to 13 GB.
- A 100 bed hospital performs 40,000 to 45,000 radiological examinations each year, which amounts to at least 2 GB of storage space per day, or up to 1 terabyte (TB) a year. (DP imagery not included)

KT-Tech: Healthcare Market

Customer pain points :

- Bandwidth is expensive, both to create and to use.
- ❖ Bandwidth costs increasing due to Increasing requirements for medical imagery storage space and transmission bandwidth. Growing use of "cloud" storage by all enterprises is pushing up bandwidth costs.
- ❖ Storage costs increasing, especially of large imagery files, as more businesses move their archives to the cloud.
- Large medical images consume large amounts (hundreds of minutes) of time and costly amounts of bandwidth to upload or download from the cloud
- Large medical images consume large amounts (tens of minutes) of valuable time to open and view on a desktop, tablet or handheld device - lowering professional productivity.

KT-Tech: Healthcare Market

KT-Tech Solution:

KT-Tech's Patented Compression / Feature Extraction Software Application:

Provides significant cost savings and increased productivity by offering the most accurate medical imagery representation at the smallest files size for:

- Medical Imagery Storage and Archiving
- Highest Transmission and Viewing Speed of Medical Imagery
- **Fast, accurate conversion of complex medical imagery to small, diagnostic quality, easy-to-handle medical imagery at only 1% to 10% the size of the original image**

Application to Medical Imagery Transmission, Viewing, Storage, and Archiving

❖ Resultant KT-Tech converted medical imagery size:

- Only 1%-10% or less of original digitized medical image file size
- Savings of 90%-99% of original digitized medical image file size

Benefits:

Significant cost and time savings for medical imagery

- Transmission and Viewing
- Storage and Archiving

KT-Tech: Healthcare Market

KT-Tech Compression/Feature Extraction Software Solution

- Fast, accurate conversion of extremely large complex medical imagery to small, diagnostic quality, easy-to-handle medical imagery at only 1% to 10% the size of the original image

Application to Digital Medical Imagery:

- ❖ Resultant KT-Tech converted medical imagery requires
 - ❖ only 1% to 10% of computational and communications (bandwidth) resources of original digitized medical image file to:
 - Store
 - Transmit
 - Receive
 - Open
 - Display (View)

Benefits:

- Significant Cost and Time Savings for Medical Imagery Transmission, Viewing, Storage and Archiving
 - ❑ Savings of 90%-99% in storage space and required bandwidth
 - ❑ Savings of 90%-99% in time of image transmission and reception over a given bandwidth
 - ❑ Significant increase in productivity due to time saved in opening and displaying (viewing) medical imagery [opportunity to use mobile devices such as tablets & smartphones as viewers]

KT-Tech Compression/Feature Extraction Software Solution

Medical Image Test Examples

The next slides provide examples of the power and benefits of KT-Tech Software

Example # 1: KT-Tech Compression of “HAND” X-Ray [*DICOM Image: Cleveland Clinic*]

- Original Image File Size = **5 MB**
- **KT-Tech Compressed Image File Size = 50 KB [1% of Original File Size (100:1 CR)]**

NOTE: Compression of X-Rays typically use 20:1 Compression Ratio [CR]= 5% of Original Size

Example # 2: KT-Tech Compression of “Spine” CT (Computed Tomography)

[DICOM Image: Johns Hopkins]

- Original Image File Size = **352 KB**
- **KT-Tech Compressed Image File Size = 12 KB [3.3% of Original File Size (30:1 CR)]**

NOTE: Compression of CT Images typically use 10:1 Compression Ratio [CR] = 10% of Original Size

Example #3: KT-Tech Compression of “Throat” MRI (Magnetic Resonance Imaging)

[DICOM Image: Johns Hopkins]

- Original Image File Size = **257 KB**
- **KT-Tech Compressed Image File Size = 26 KB [10% of Original File Size (10:1 CR)]**

NOTE: Compression of MRI Images typically use 5:1 Compression Ratio [CR] = 20% of Original Size

Example #4: KT-Tech Compression and Unique “Zoom” of Extremely Large Dermatology Image (Original size 13 GB)

[DICOM Image: Dermopath Lab of Central States]

- Original Image File Size = **13 GB**
- **KT-Tech Compressed Image File Size = 612 MB [4.6% of Original File Size (22:1 CR)]**

NOTE: Compression of Dermatology Images typically use 10:1 Compression Ratio [CR]=10% of Original Size

KT-Tech Compression on Sample "Hand" X-Ray

Original File size = 5 MB

KT-Tech Compressed File Size =
50 KB or .05 MB =
1% of Original File Size [100:1 CR]



NOTE: Compression of X-Rays typically use 20:1 Compression Ratio [CR]= 5% of Original Size

KT-Tech Compression on Sample “Spine” CT Scan

Original File Size = 352 KB



**KT-Tech Compressed File Size =
12 KB**

3.3% of Original File Size [30:1 CR]



NOTE: Compression of CT Images typically use 10:1 Compression Ratio [CR] =10% of Original Size

KT-Tech Compression on Sample “Throat” MRI

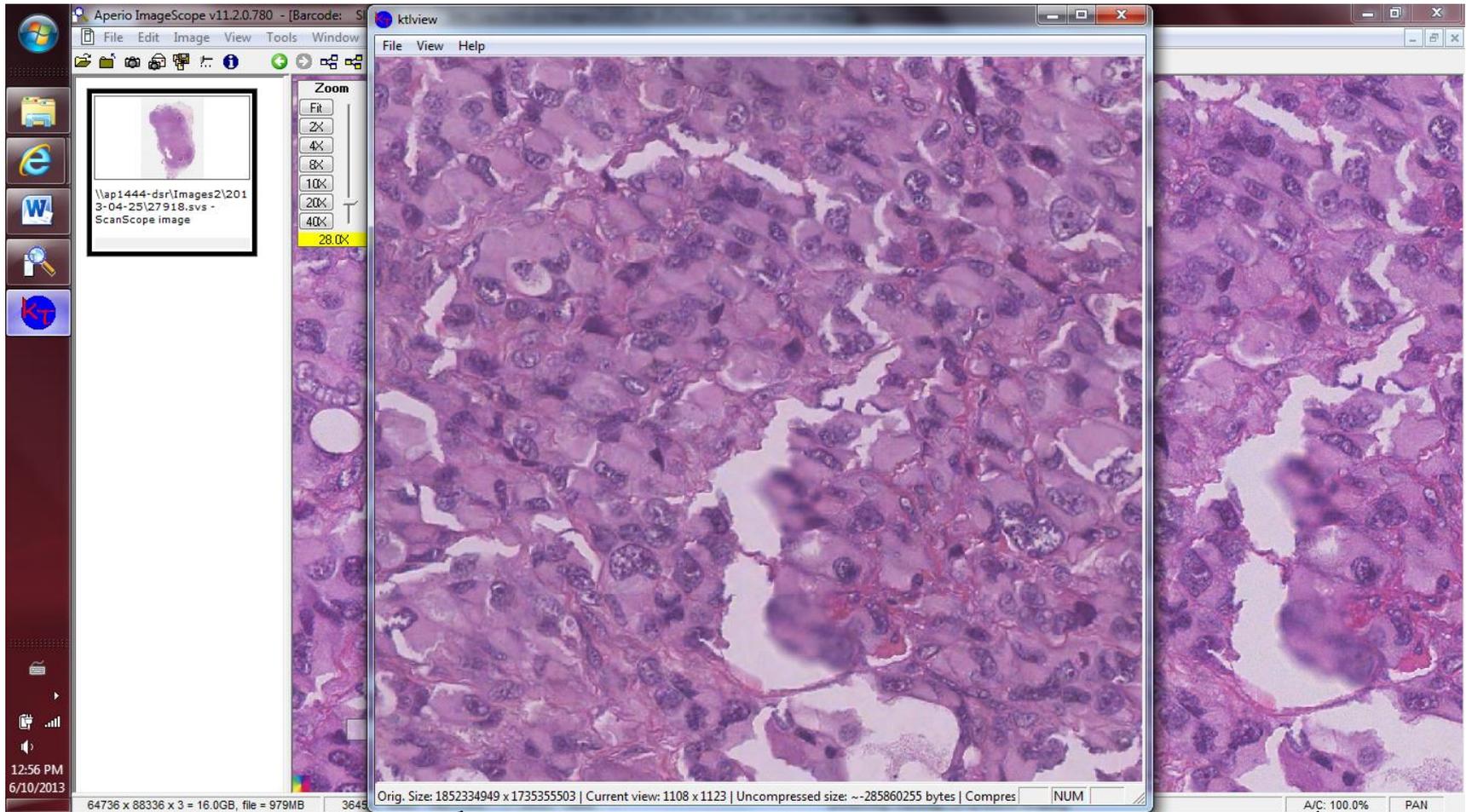
Original File Size = 257 KB

KT-Tech Compressed File Size = 26 KB
10% of Original File Size [10:1 CR]



NOTE: Compression of MRI Images typically use 5:1 Compression Ratio [CR] =20% of Original Size

KT-Tech Compression and Unique “Zoom” of Extremely Large Dermatology Image (Original size 13 GB)



**KT-Tech Compressed File Size= 600 MB
4.5% of Original File Size [22:1 CR]**

Original File Size= 13 GB

NOTE: Compression of Dermatology Images typically use 10:1 Compression Ratio [CR]=10% of Original Size

Observations

- Testing conducted using double blind test to Medical Experts at Mayo Clinic and Johns Hopkins
KT-Still Image Compression was overwhelming viewed as providing a better user experience
- KT-Still Image Lossy Compression, unlike data-lossless compression, eliminates both sensor noise and digitization noise **resulting in improved visual experience**

Benefits of KT-Tech Software Solution for Healthcare Market

KT-Tech: Provides significant cost savings and increased productivity by offering the most accurate medical imagery representation at the smallest files size and highest transmission speed and viewing speed.

❑ Significant Cost and Time Savings for Medical Imagery Transmission, Viewing, Storage and Archiving

- Savings of 90%-99% in storage space and required bandwidth
- Savings of 90%-99% in time of image transmission and reception over a given bandwidth
- Significant increase in productivity due to time saved in opening and displaying (viewing) medical imagery
- Enabling medical personnel mobility away from radiology centers [opportunity to use mobile devices such as tablets & smartphones as viewers]

Benefits of KT-Tech Software Solution for Healthcare Market

Allows Telemedicine Directly From the EMR in the Field

How?:By decreasing usable image size to 1% to 10% the size of the original image

for Rapid Transmission even over Narrowbandwidth Connections

(>10:1 compression ratio [CR])

- Provides highly compressed images with unsurpassed visual quality
- Ten times faster encoding/decoding than JPEG 2000
- Progressive structure (All compression ratios available from a single file)
- Data-Lossless at less than ½ the size of JPEG 2000
- Visually Lossless at 1% to 10% the size of the original image

Unique Large Image Zoom

The KT-Tech Large Image format is designed to allow the quick retrieval of data in a very large image at different locations and at different scales.

- Provides usable image size of ~ 5% or less of original size saving storage, speeding acquisition, transmission and display
- Provides extremely large image support (up to 36 GB) with unique “zoom-in” capability down to camera resolution level
- Provides superior analysis capability for medical and satellite imagery
 - **No** inter-pixel interpolation, additions or distortions of original image, unlike other competitive digital zooms