Modeling with Unstructured Data

March 10th, 2014
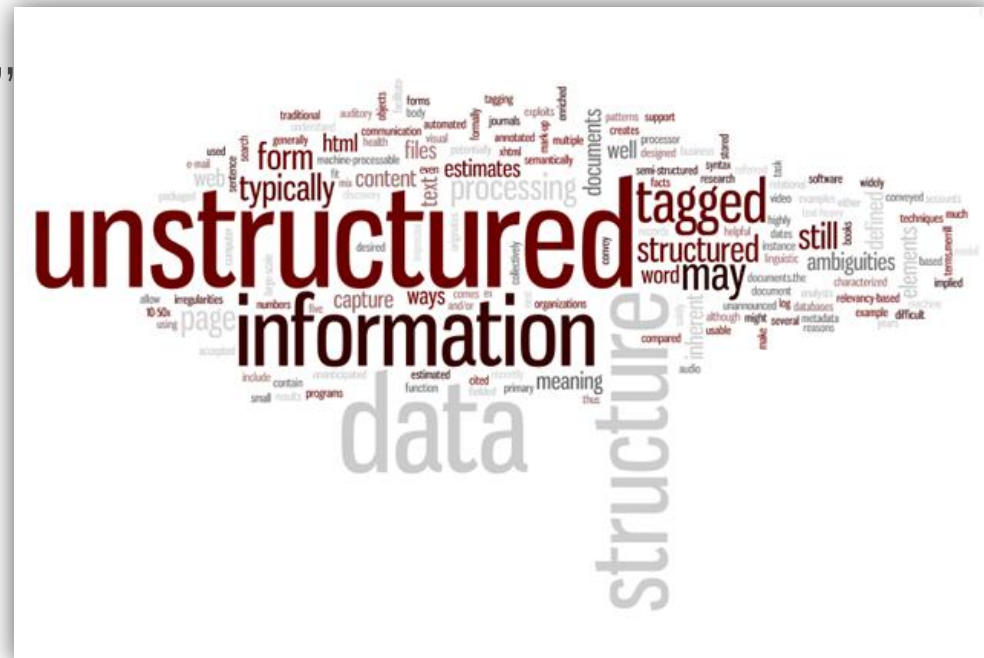
Overview

- Always on the lookout for new and better data sources and variables
- Strive to gain better insights from our data
- Unstructured data
  - The other side of "Big Data"
  - Where to find it?
  - How to use it?

Topics to Discuss

- Imagery Analytics
  - Brief history of imagery in analytics
  - Extracting data from images
  - Initial uses outside of insurance
  - Applications within insurance

- Social Media Analytics

Imagery for Business Decisions

ISO

**Insurance Programs
and Analytic Services**

Topics to Discuss

- Imagery analytics
  - ➤ Historic timeline of imagery
- Extracting data from images
- Common uses today
  - ➤ Outside of insurance
- Applications within insurance
  - ➤ Roof dimensions & inspections
  - ➤ Validating application information
  - ➤ Telematics (auto and home)
  - ➤ License plate readers & vehicle recovery

Timeline of Imagery

First patent for remote UAV by Nikola Tesla
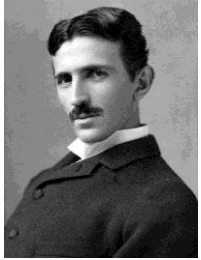
Digital images in real time

First digital image

Drones approved by FAA and available to consumers

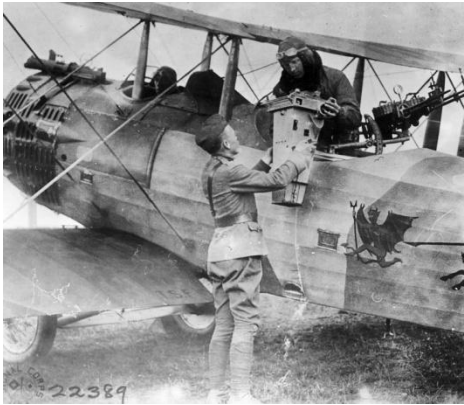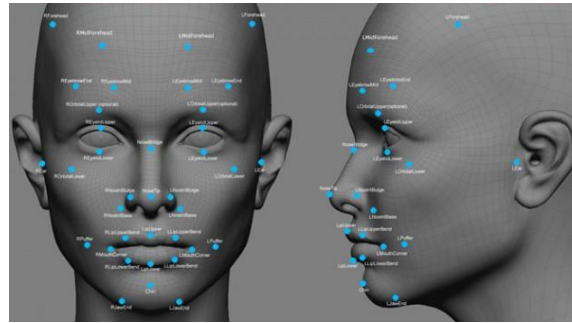| 1826	1898	1916	1920	1962	1966	1996	2014

WWI starts collection of aerial imagery

First photograph by Joseph Niepce

Facial recognition developed

High Def Image and Video DVB (1080p, 720p, etc.)

Current uses of image analytics

- Driven by military and defense
- Security – city cameras
- Healthcare a perfect domain
- Marketing research
- Sports

[+] Enlarge

Brad Penner/USA TODAY Sports

The Bucks used Dan Hill's facial coding research as one of the determining factors in selecting Jabari Parker with the No. 2 overall pick in the NBA draft.

Predator drone

Lung imaging

Extracting Data From Images

- An image is a set of signals sensed by the human eye and processed in the brain to instantly associate objects and concepts previously received and stored in memory
- To a computer, an image is either a sequence of pixels or set of color-annotated polygons.
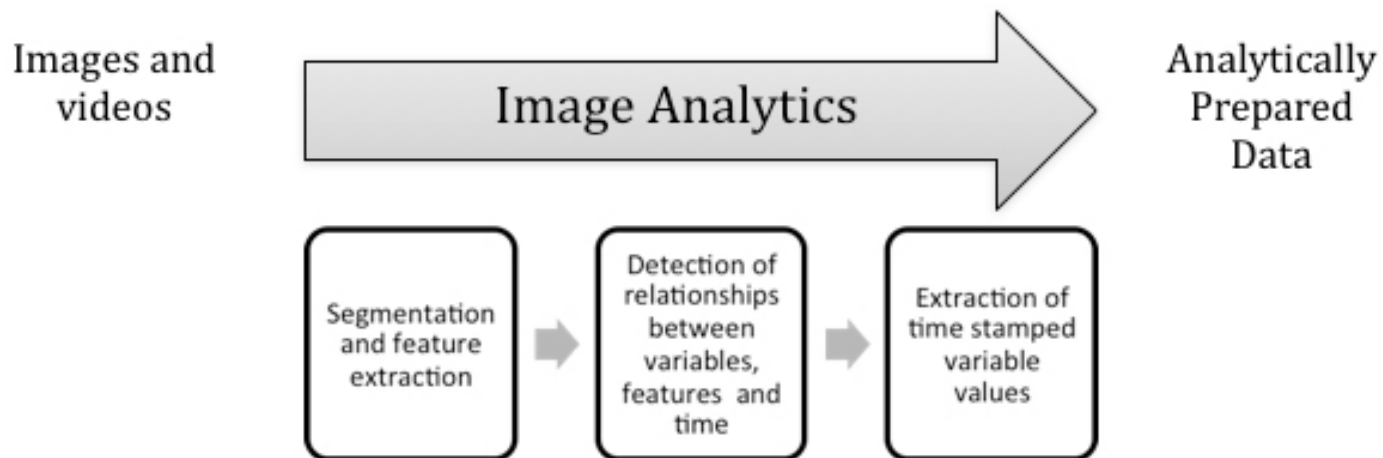
Image Transformation

- <u>Image segmentation algorithm</u> – process image to identify edges, boundaries, regions, etc. Popular algorithms include: boundary detection, color gradients, contour maps, and multi-scale gradient magnitudes
- <u>Feature extraction</u> – assists in the detection of higher-level characteristics and low-level features are extracted and stored with each instance. Common algorithms include: shape identification, color histograms, differential geometry operators, and scale transformations
- A wide variety of software and languages can be used including C+, MATLAB, Sony Image Converter, etc.

Getting Data From Images

confidence: 95
},
- mood: {
    value: "angry",
    confidence: 93
},
- tongue: {
    value: "in",

confidence: 95
},
- mood: {
    value: "happy",
    confidence: 86
},
- tongue: {
    value: "in",

confidence: 95
},
- mood: {
    value: "neutral",
    confidence: 85
},
- tongue: {
    value: "in",

confidence: 95
},
- mood: {
    value: "sad",
    confidence: 90
},
- tongue: {
    value: "in",

Odometer reading – 91,308

While a picture may not always be worth 1,000 words,
It can certainly be good for a couple new variables

Applications within Insurance

ISO
Insurance Programs
and Analytic Services

Applications in Insurance

- Roof dimensions & inspections
- Estimating damage & losses
- Validating application & claim information
- License plate readers & vehicle recovery

Core Inspection Reporting

- Roof Structures and Accessories
- Debris and Environment
- Coating Type and Condition
- Granular Loss
- Cracks, Blisters and Punctures
- Ponding, Leaks and Edges
- Corrossion and Physical Damage
- Energy Efficiency Impact
- Skylights, Hatches and Vents
- Analysis Data and Recommendations

Roof Inspections

- Roof dimensions and materials remain a hot topic in homeowners for loss estimates
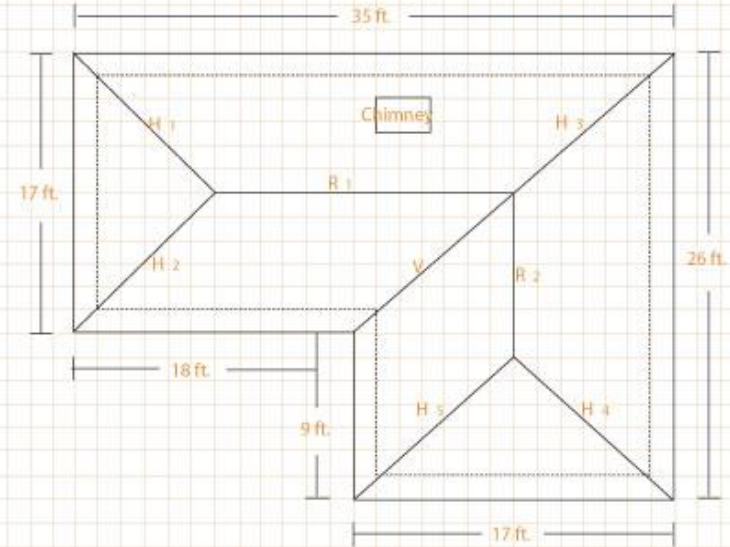- Roof inspections are costly and one of the most dangerous tasks associated with property estimating.
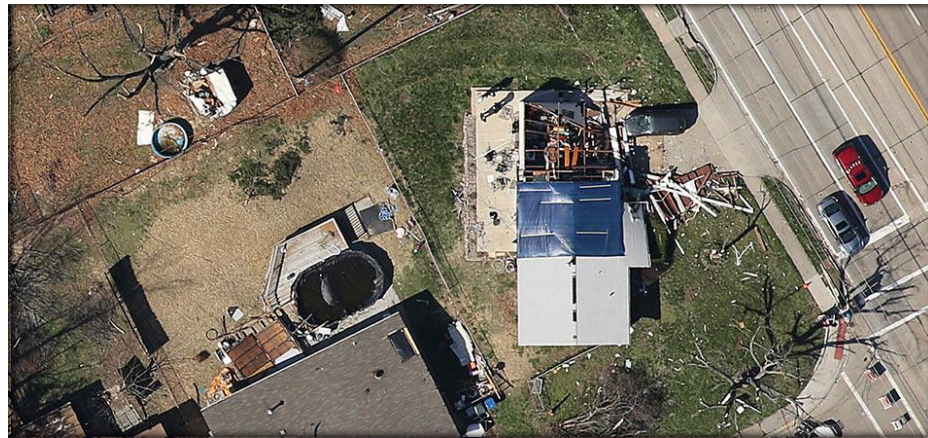
Roofing Dimensions – Aerial Sketch

$R_1 = 18$ ft.

$R_2 = 8\ 1/2$ ft.

$V = 12\ 1/2$ ft

$H_1 = 12\ 1/2$ ft.

$H_2 = 12\ 1/2$ ft.

$H_3 = 12\ 1/2$ ft.

$H_4 = 12\ 1/2$ ft.

$H_5 = 12\ 1/2$ ft.

Overhang = 2 ft.

Slope = 6/12

Sample roof sketch with measurements.

Aerial Damage Investigation

Investigate Damage Virtually
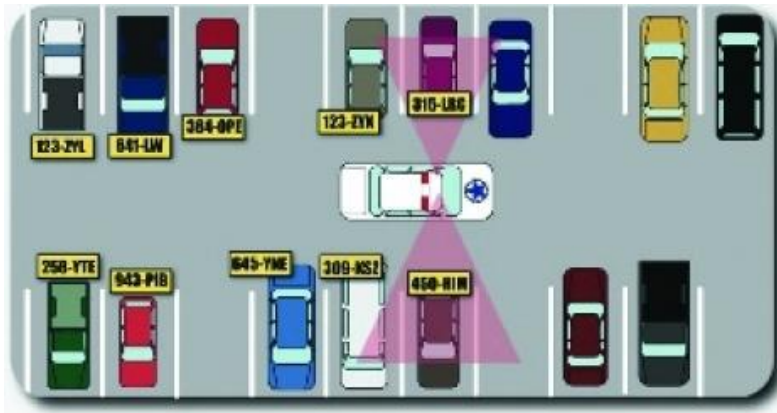
Vehicle Damage Estimates

- More and more companies and repair shops are getting faster damage estimates from pictures. Most of the work is still manual, but automation is in progress.

License Plate Readers

- Captures license plate numbers, location and time
- Stationary cameras and mobile cameras
- Can determine where a car is at a given time
- Theft recover applications
- Garaging address validation

Thank You