data-mining for the steel industry

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in short

1. trends and evolution
2. video “mining” techniques
3. use cases
trends and evolution

if everything is connected (in the internet of things) ...

advantages

› efficient (re-)use of resources like sensors
› more information is better decision making
› multi-use cases (inspection, security)

caveats

› information overload (more is better?)
› quality of information
› privacy of you and me (storing video data)
networks meet fusion

“sensor networks”

• ‘small’ sensors
• all the same
• quantity over quality
• simple data processing

• resource management
• scalability
• robustness

“sensor fusion”

• ‘smart’ sensors (e.g. video)
• heterogeneous
• quality by aggregation
• complex data processing

• processing and estimation
• situation awareness
• data mining
networks meet fusion

“sensor networks”
- ‘small’ sensors
- heterogeneous data
- complex data processing and estimation
- situation awareness
- scalability
- robustness

“sensor fusion”
- ‘smart’ sensors (e.g. video)
- simple data processing
- resource management
- scalability
- robustness
- situation awareness
- data mining

SENSOR INTEGRATION
what can video analysis/mining do?

video fingerprinting (near-duplicate recognition)
  ▶ does a video (or part of it) exist in our databases?

summarization:
  ▶ making one minute video from one hour.

categorization
  ▶ what kind of video is it?

object- and logo recognition
  ▶ does an object or logo (image) exist in our databases?

behavior analysis
  ▶ does something out of the ordinary happen in a video?

enhancing image quality
  ▶ how to enhance video quality for a specific task?
video fingerprinting is watermarking without the watermark
video fingerprinting: does a video exist in our databases?

video fingerprints take into account:
- resolution
- codec
- noise
- color

example use case:
child-abuse material
video fingerprinting: finding back old archive recordings

Google object recognition ...
... is ready for your input
applications object and logo recognition

http://www.omniperception.com/products/magellantm_brand_exposure_analysis
generate poses with human 3D model

find pose in (edge) image

combine with other cameras

track pose over time to assess behavior

left arm pointing
behavior analysis from video
flow orientations

flow magnitudes
Challenges for data / video-mining in the steel industry

- Surveillance (safety-related)
- Early warning (prevent or minimise disruption of process/product)
- Operator support (an addition to existing camera registration / inspection techniques)
- Increase level of automation
- Root Cause Analysis (additional to process/installation data)
- Reduction and/or standardisation of processing and handling times
- Human behaviour
- …
BOS (Steel plant – slab casting)

• Situation: More than 200 camera’s (general)
• Usage: Control, safety, up to automation

How many screens to guard?
Are we missing events?
Analyzing video streams?
Process improvement

Raw material handling: scrap

Can scrap content be identified or classified?
## Process and product (surface quality) control

### Hot Rolling

- **Situation:** Several camera's (general and specific ones)
- **Usage:**
  - Inter stand strip behaviour (cobbling!)
  - Surface oxide / nozzle performance
  - Coiling behaviour

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**Early Warning**

**Root Cause**

**Quality control**
data mining for the steel industry
Questions?

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