Kyutech, Iizuka, February 25, 2020

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Human-Centered Computing Lab

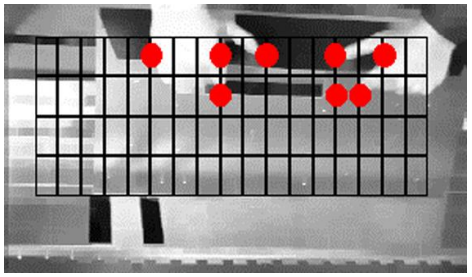
Mario Köppen
情報創成のケッペンマリオ
CI, Kyushu Institute of Technology

Fraunhofer IPK, 1992-2006

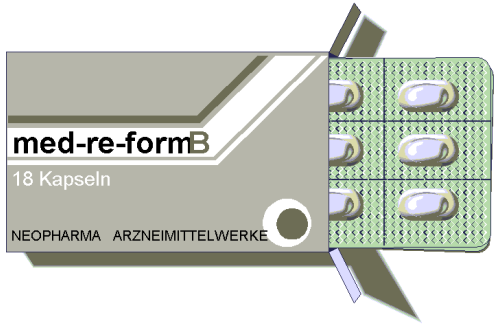
Security Task Automation

Carplate Recognition

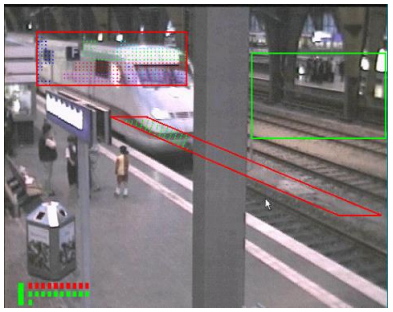
Surveillance of Dangerous Zones



Packing Imprints Check

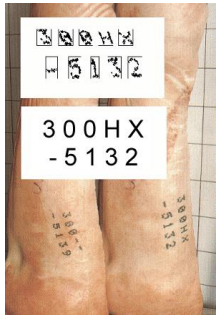


Train Stop Detection



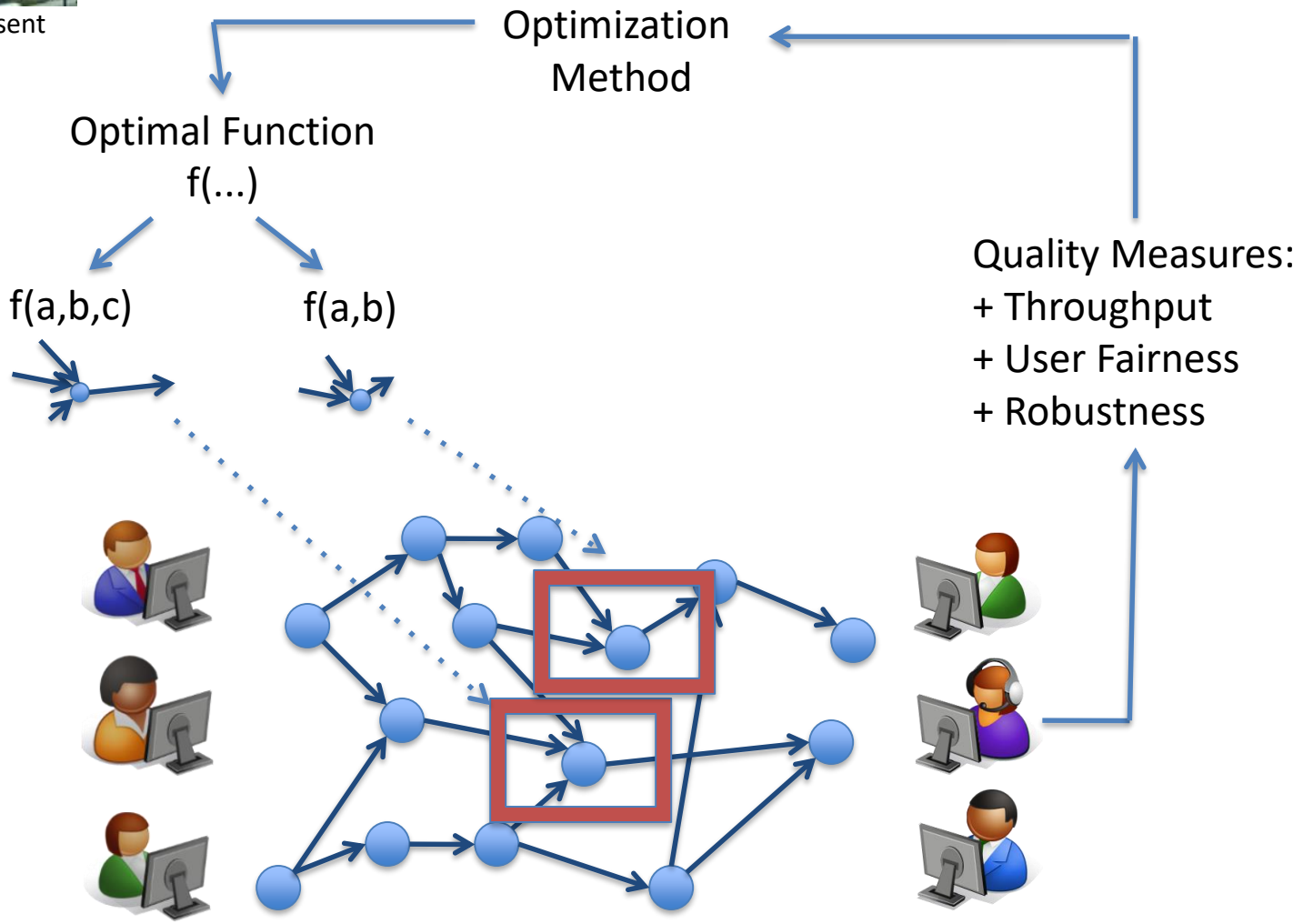
Gate Area Surveillance

Checking Animal Tattoos



Kyutech, 2006-present

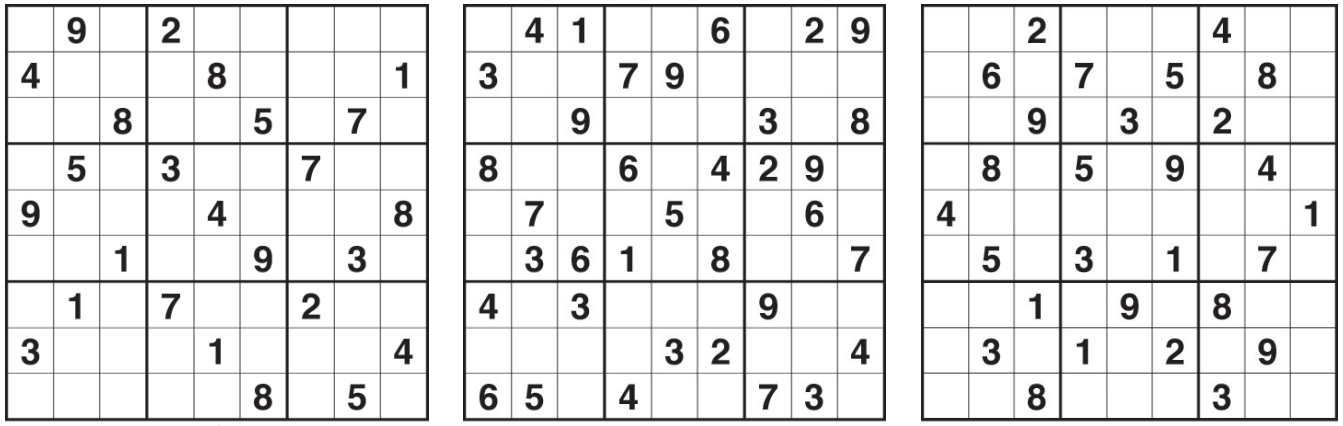
Optimization in Information Networks



Human-Centered Computing

RESEARCH TOPICS

1. Human Assessment (HA)



Which of them is MORE DIFFICULT?

Which of them is MOST DIFFICULT?

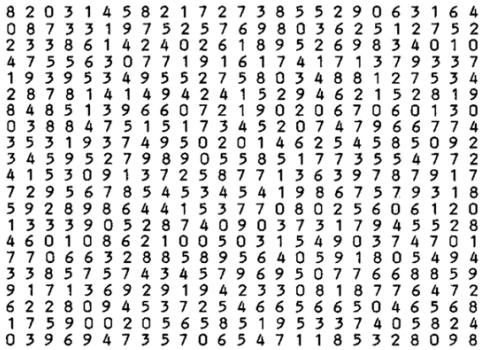
pairwise comparison = binary relation

*maximal/greatest element of that relation**

Difficulty of a logic puzzle like Sudoku

*no need for numerical “difficulty” values

Human Assessment contd.



MORE random?

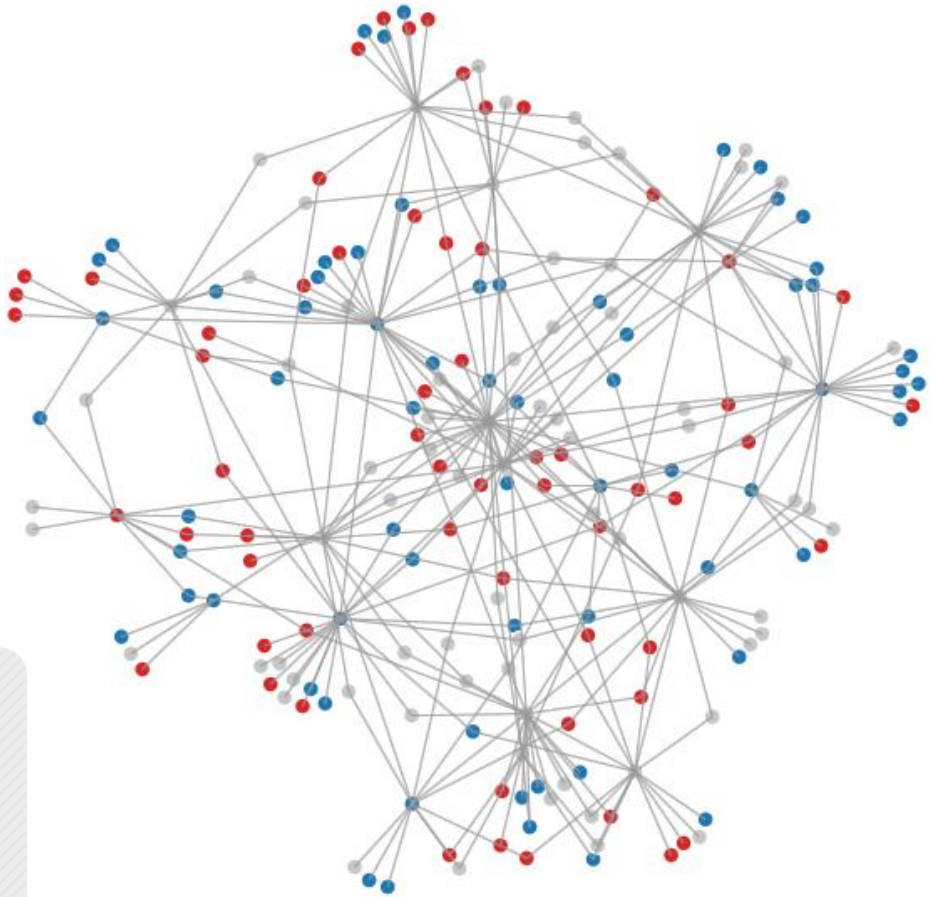
LESS unfair?

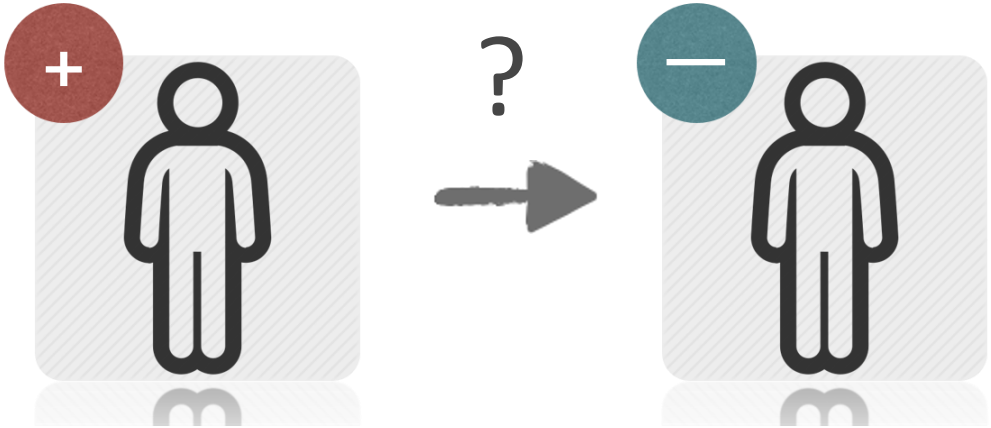
MORE natural (e.g. walking)?

Modeling social influence based on opinion transition

Naohiro Iwamoto, Master Thesis

- Investigating how people change their opinion
- Keyword:
  Network simulation,
  Opinion transition,
  Scale-free network.

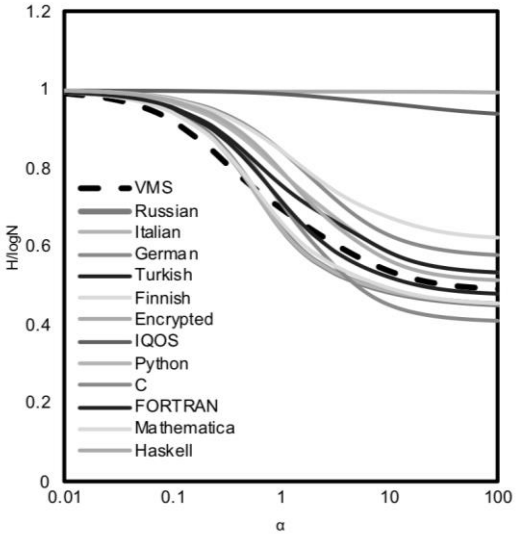




Entropy analysis of questionable text sources through the example of the Voynich Manuscript

Natsuki Koyama, 2019

Voynich Manuscript: 15th century handwritten and illustrated codex in an unknown writing system



Renyie-Entropy analysis shows its resemblance to natural language, but also its differences.

Online Sentiment Analysis of Social Media

Mohamad Bazarin, 2019

Child Protection in the internet, e.g. tagging violent content in (even) Kids Youtube, by online acoustic feature classification (SVM) into emotional states. (Paralinguistics, Sentiment Analysis).

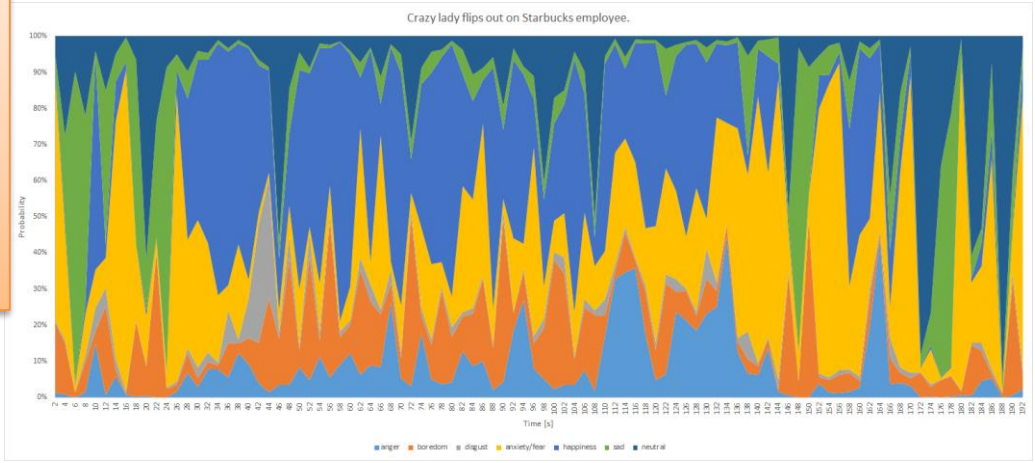
Table 1: Features and Functionals used.

Low-level Descriptors (15)	Functionals (6)
Mel-frequency Cepstral Coefficients (1-12), Zero Cross Rate, Root Mean Square (RMS), Harmonic-to-noise Ratio (HNR)	Mean, Standard Deviation, Kurtosis, Skewness, Minimum, Maximum

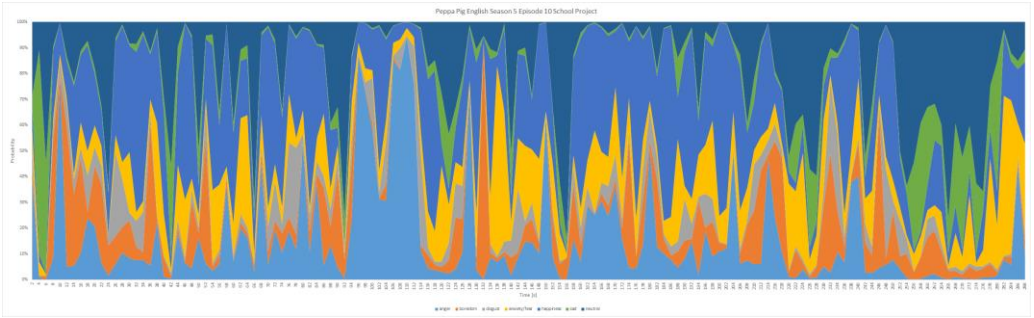
Table 3.1: Target numbering for each emotion.

Label In Emo-DB	Emotion	Target Numbering
W	Anger	0
L	Boredom	1
E	Disgust	2
A	Anxiety/Fear	3
F	Happiness	4
T	Sadness	5
N	Neutral	6

Life Sentiment Analysis of Youtube Videos

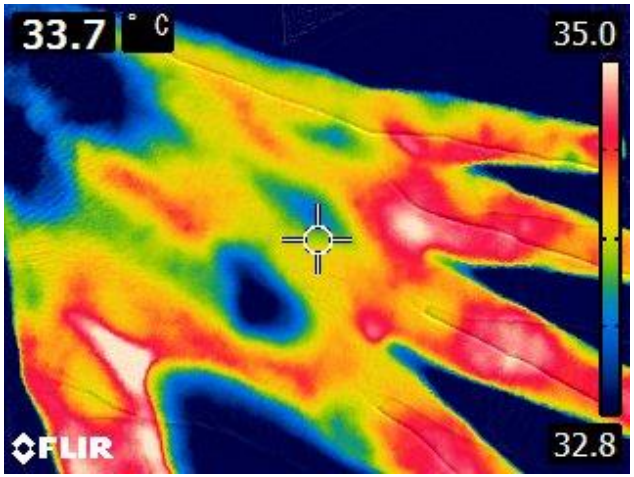


"Crazy lady at Starbucks"



Peppa Pig

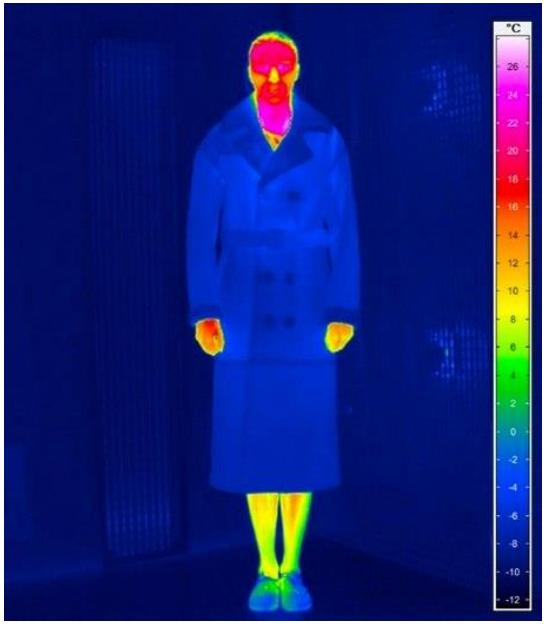
2. Human Sense Expansion, Other Sensorics

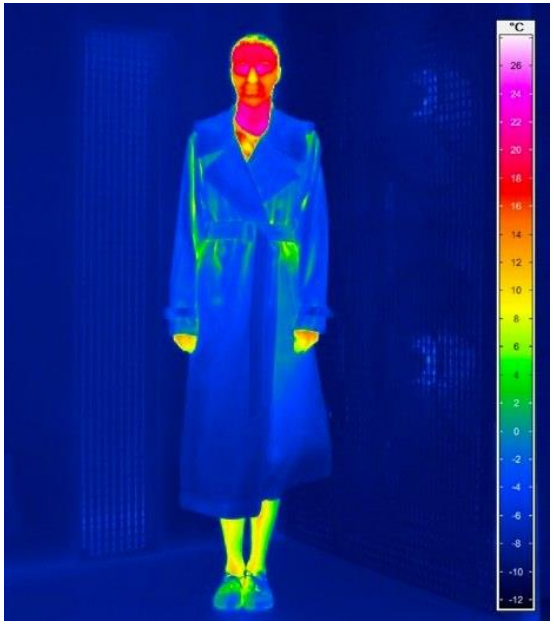


Hand Vein Biometrics

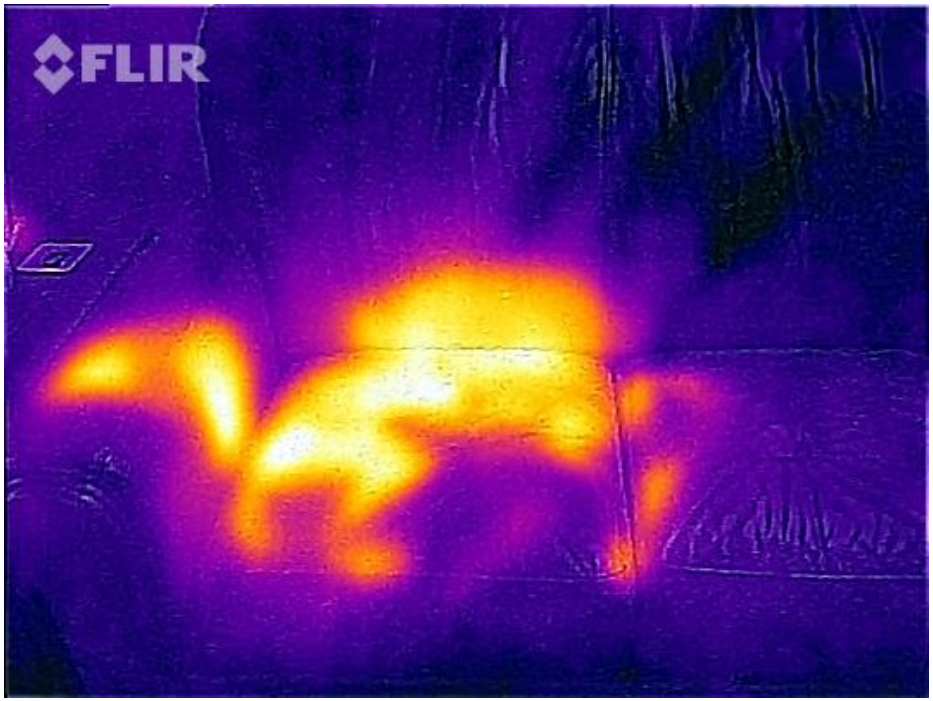
Thermo-Camera

Winter Clothes Heat Loss Inspection





2. Thermal Imaging: A novel perspective



Dog was on sofa - again…

Which drink is colder?

(images from Flir ONE gallery)

PSEUDO-COLOR TECHNIQUES And APPLICATIONS

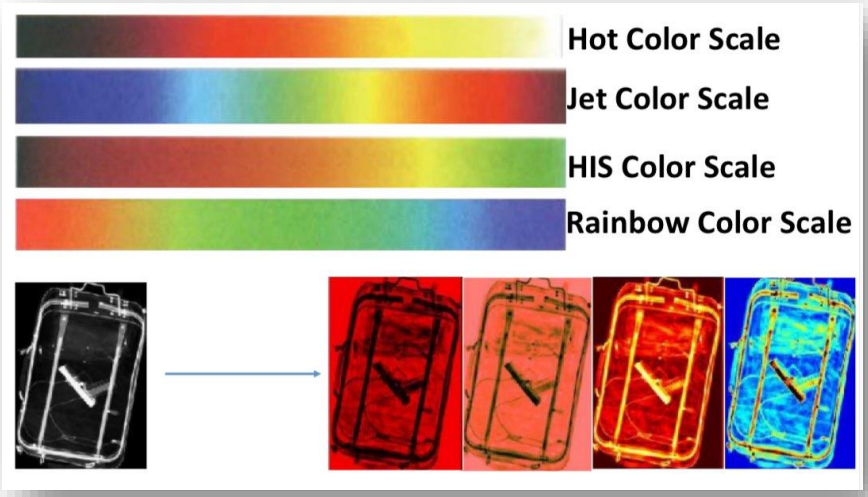
Dwilya Makiwan, Master Thesis

Image Color Change
Related to color-to-grey conversion methods and color mapping

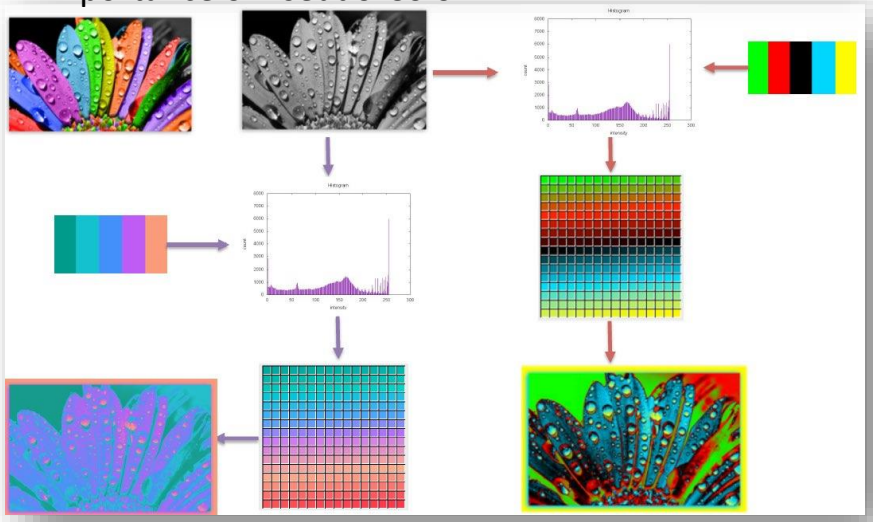
IEC (Interactive Evolutionary Computation)
Interactive Genetic Algorithm to define the color palette to be used for Image Color Change.

SOM (Self Organizing Map)
Neural Network to select impression words during IGA

Impression Words
Whole process leads to idea of providing Impression Words



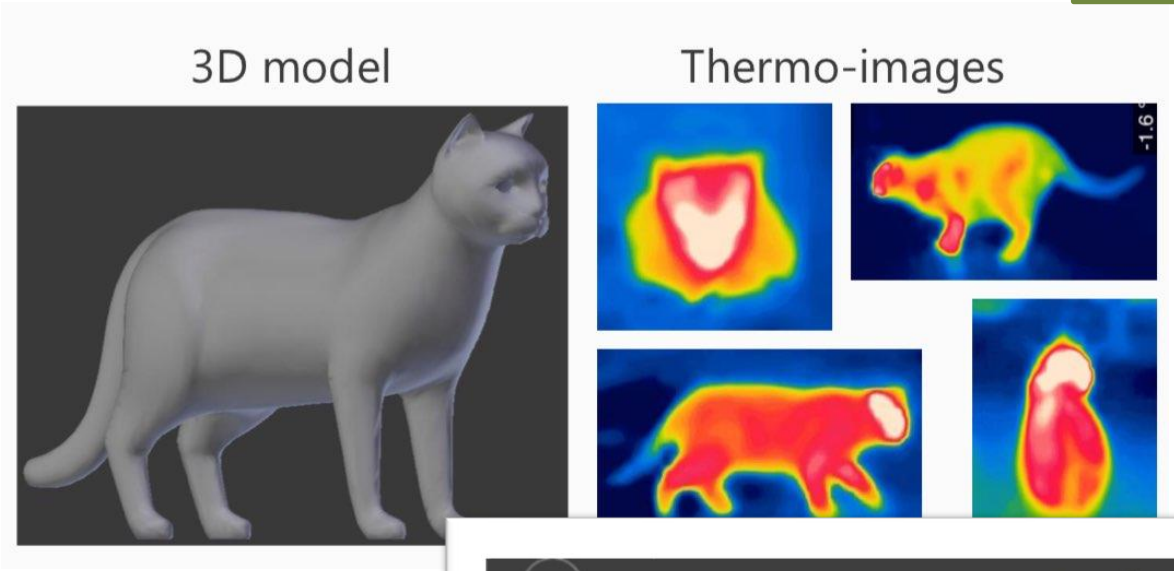
Importance of Pseudo-Color



Proposed Approach

Creation of thermo-object 3D-model from a heat-camera

Naohiro Iwamoto, Bachelor Thesis



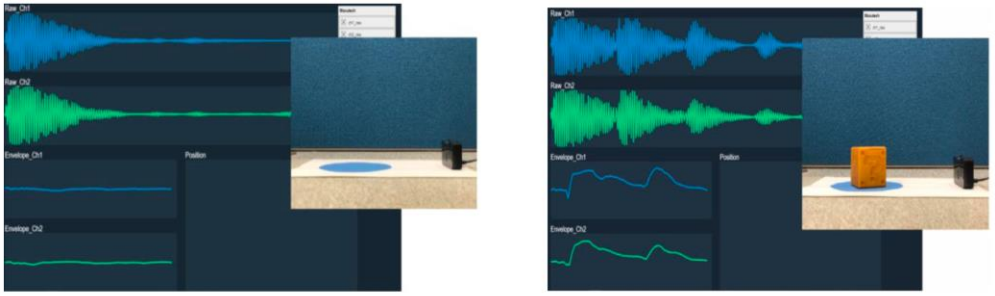
UV Mapping

Creation of thermo-object 3D models.

Liquid Detection in Object Using Mobile Ultrasound Device

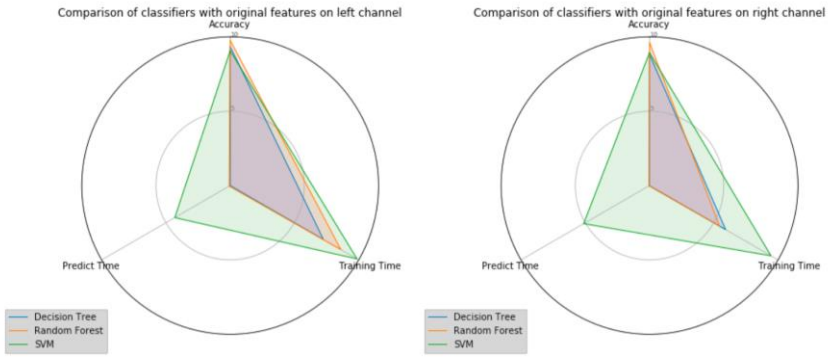
Hafidan Izrad, 2020

Welle Device: low-cost, mobile, IoT-enabled Ultrasound device. Compared to (much) higher-priced models, how precise is it?



(a) Initial state. (b) State with object.

Figure 5.3 Two states of raw echo data.



(a) Left Channel (b) Right Channel

Figure 7.1 Comparison of classifiers with original features

3. Biometric Integration

NewScientist

Your telltale video camera shake can identify you

› 12 December 2014 by Chris Baraniuk
› Magazine issue 2999. Subscribe and save
› For similar stories, visit the Crime and Forensics Topic Guide

HERE's a way to shake off
cameras contains a "motio
identify police wearing bod
protesters uploading footag

Shmuel Peleg and Yedid H
collected footage from 34
They ran it through an algo
to each person.

This was achieved by divid
of these blocks between fr
camera. When videos were
the movement alone who
Just 12 seconds of video
(arxiv.org/abs/1411.7591).

"People who upload videos
think they are," says Peleg
wear cameras, this may gi
are being shown is from th
edged sword."

This article appeared in pri
you away"

RT

Hacker steals fingerprint from photo, suggests politicians wear gloves in public

Published time: December 30, 2014 04:51
Edited time: December 31, 2014 13:34

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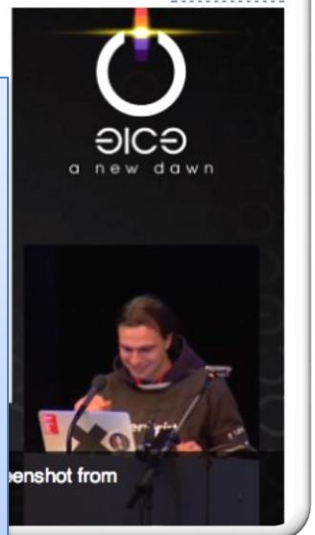


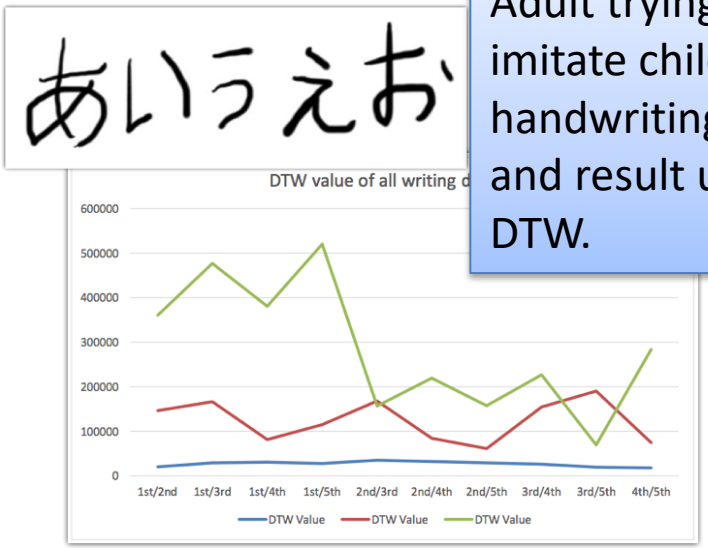
Is there a way to avoid such kind of identification?

- after-processing of videos and images to avoid biometric identification
- cancelable biometrics (include secret information in the processing)
- identification of biometric devices (e.g. identify kind of fingerprint sensor from fingerprint image)

Suitability of touch-screen based tablet-PC for dynamic handwriting evaluation tasks

Yuta Okuzono, Bachelor Thesis

- Some assaults have happen through internet services for children or teenagers.
- Biometric authentications provide more robust security from unauthorized intrusion.



Adult trying to imitate children handwriting, and result using DTW.

The purpose of this study is to evaluate the suitability of Stylus Pen with iPad and Pen Tablet for distinguishing adult and children handwriting.

4. 3D-Data Watermarking

presently

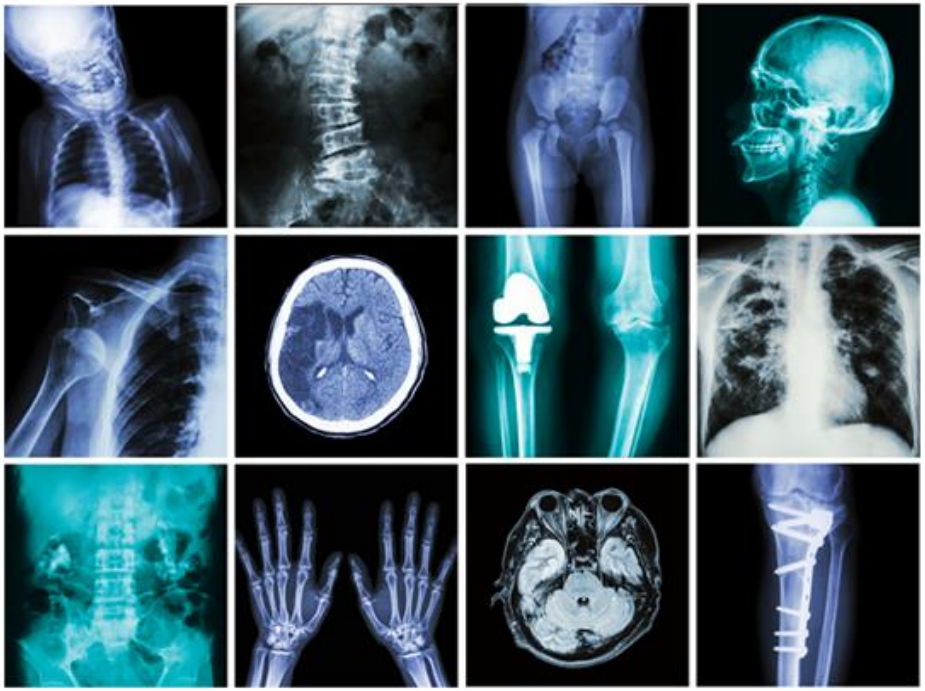
Challenge is to develop techniques for hiding information in 3d-designs that is not perceived at the 3d-print, but can be used for copyright proofs later on.

3D Printing Counterfeits

the future?

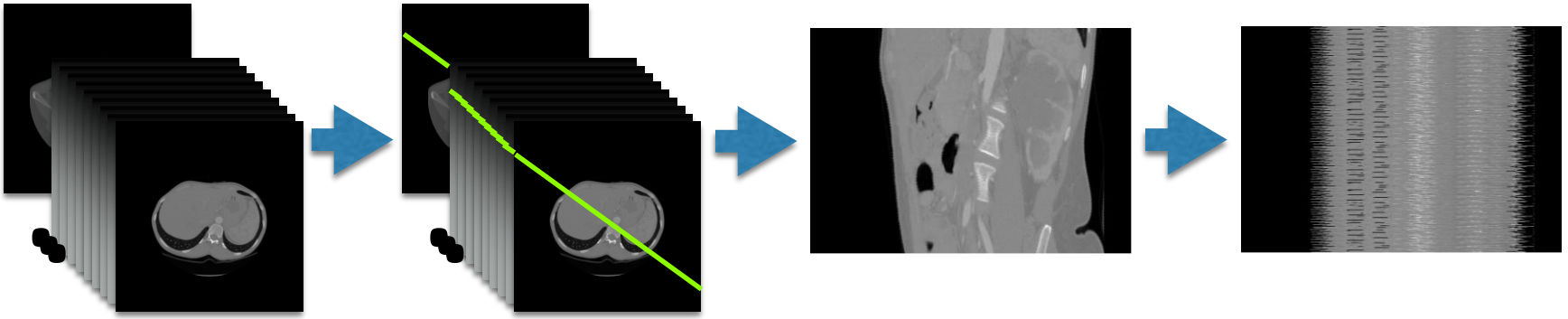
3D Watermarking Secret Direction Scheme for Volumetric DICOM Images

Ajif Pratama, Master Thesis



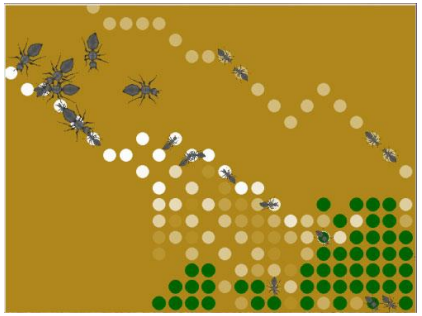
Apply new method three-dimension watermarking secret direction scheme into multi frame DICOM image

Keywords ; medical imaging, 3D Watermarking, Secret Direction.



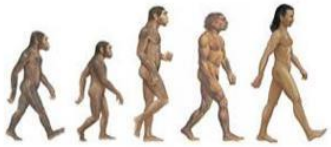
5. Bio-Inspired Optimization and Learning Algorithms & Sources

Ant Colony Optimization



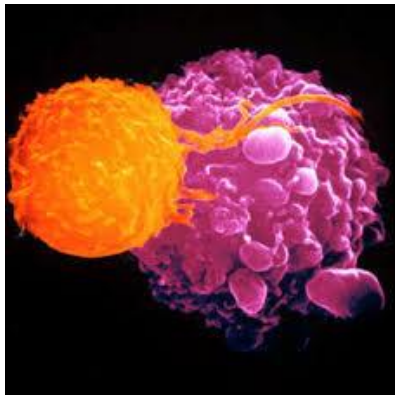
PSO
Particle Swarm Optimization

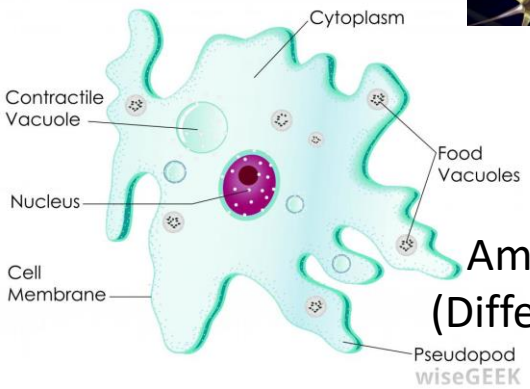
Evolutionary Computation



Neural Networks

Artificial Immune System





Amoeba Algorithm
(Differential Evolution)

Blockchain Scheme Based on Evolutionary Proof of Work

Willa Ariela, Doctor Course

In recent years, applications of the **blockchain** concept, esp. as ledger for **bitcoin** transactions, has already resulted in huge amounts of **wasted** electrical **energy** for performing the **Proof-of-Work** tasks (cryptographic puzzles). Here, we consider an **alternative** concept to have this energy used at least for a useful purpose, the **solution of real-world optimization problems**.

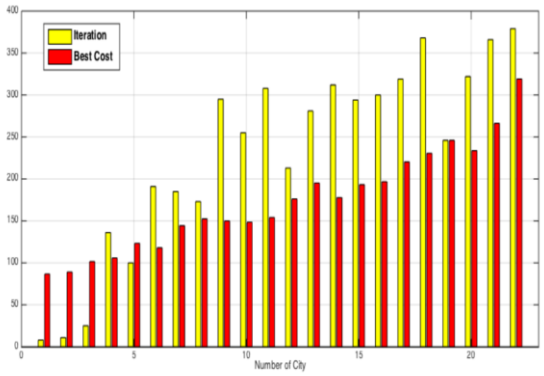


Fig. 6: The frequency of the Iteration number versus optimized cost value for TSP problem .

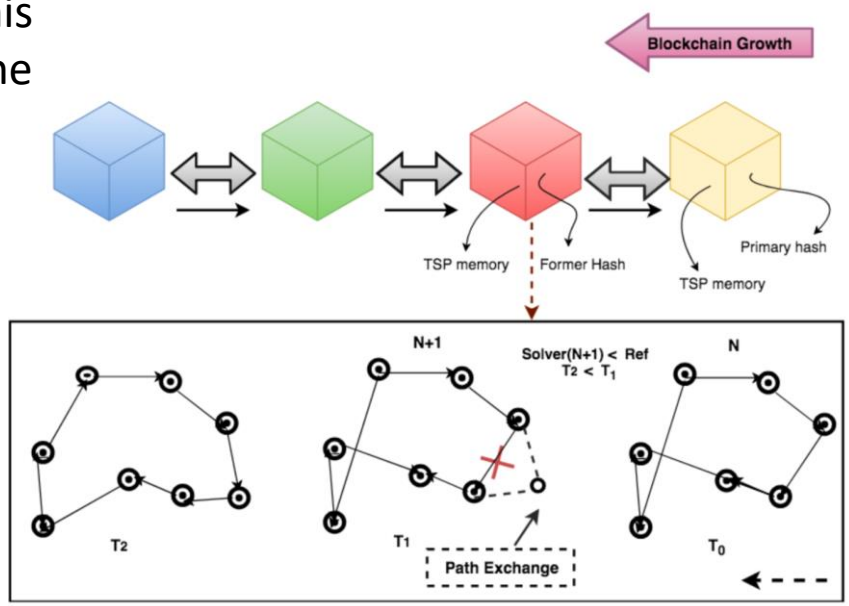
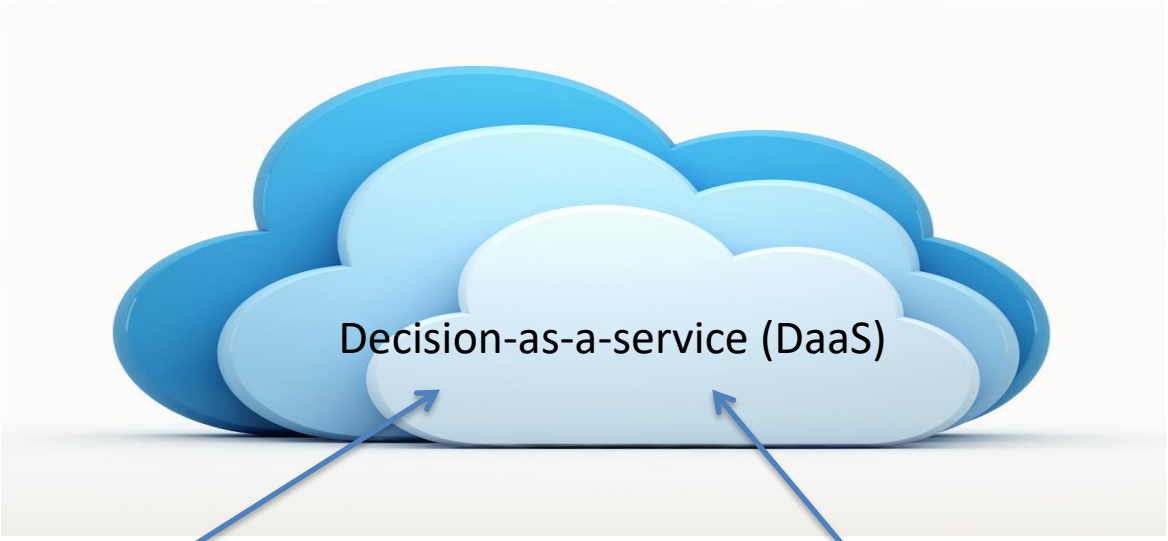
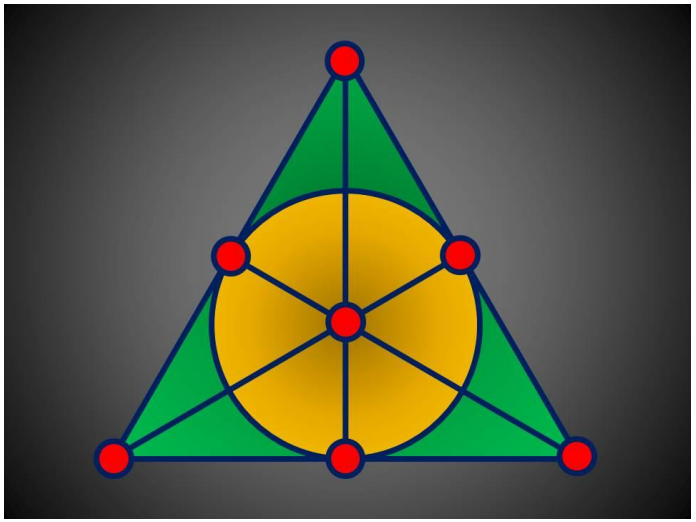


Fig. 2: General procedure of the proposed scheme.

6. New Services: Cloud, IoT, Blockchain



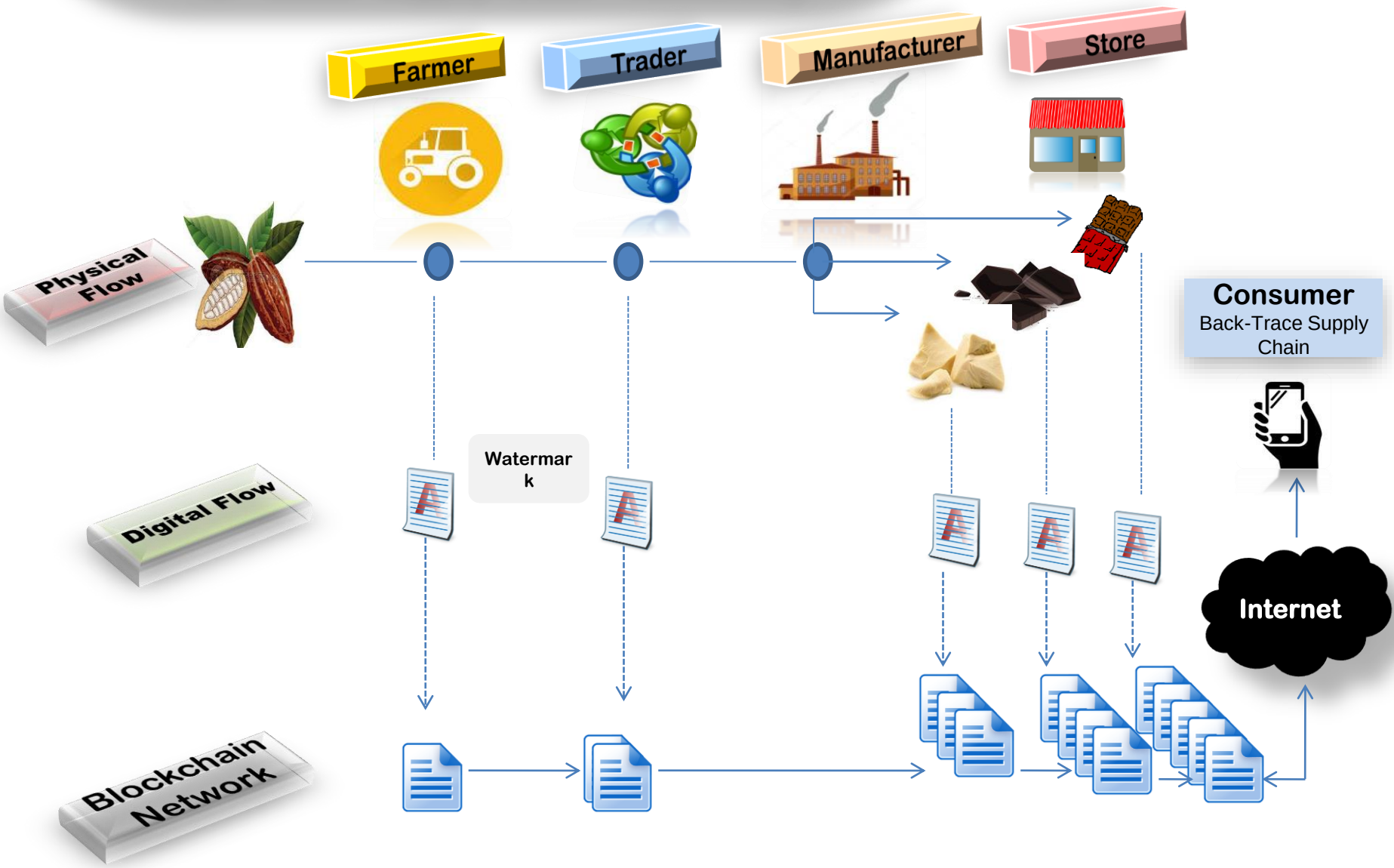


Combinatorial Design

Decision Making

Blockchain
for Cacao Supply Chain Traceability

Andi Arnie, Doctor Course



OpenSim Virtual Lab

hg.metro.land/LabLand

Smart Farming Innovations