

NEW METHODS OF DETECTION IN COMPUTER VISION

Introduction

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VIDEOANALYTICS 2.0

Predictive Behavioral Videoanalytics
in real life situations



- ### Content
- Theoretical Concept
 - Technical Realization
 - Results

Introduction

- Description
- Content



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Theoretical Concept

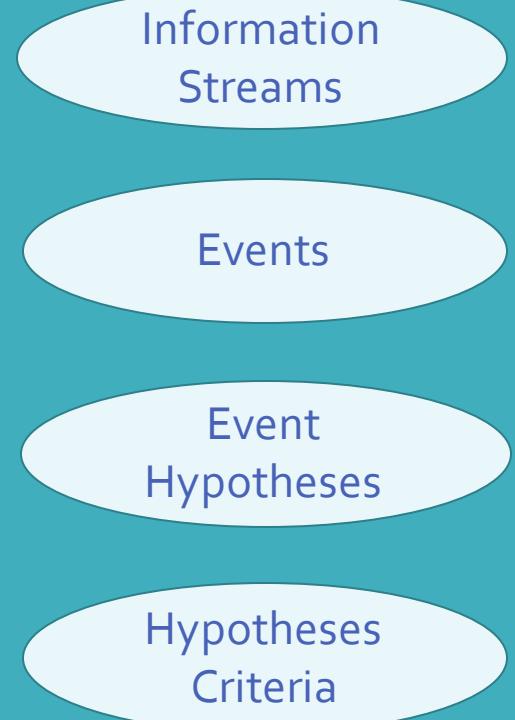
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General

Abstraction
Ladder

Example

Specific



Theoretical Concept

- Abstraction Ladder
- Structure of Computational Space
- Motion of Probabilities
- Example



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Theoretical Concept

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Advantage – analysis of complex events in real time

		Timeline of the information flow (frames)			
		Decision Interval 1		Decision Interval 2	
Event 1	Hypothesis 2	Hypothesis 1			
	Criterion 2	Criterion 3	Criterion 2	Criterion 1	
	Criterion 4				
	Criterion 5				

Theoretical Concept

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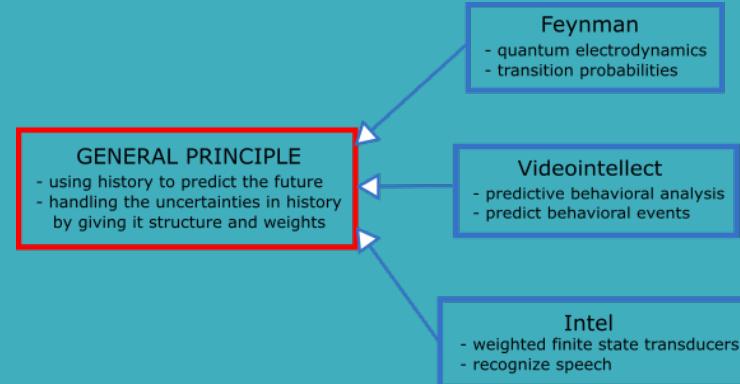
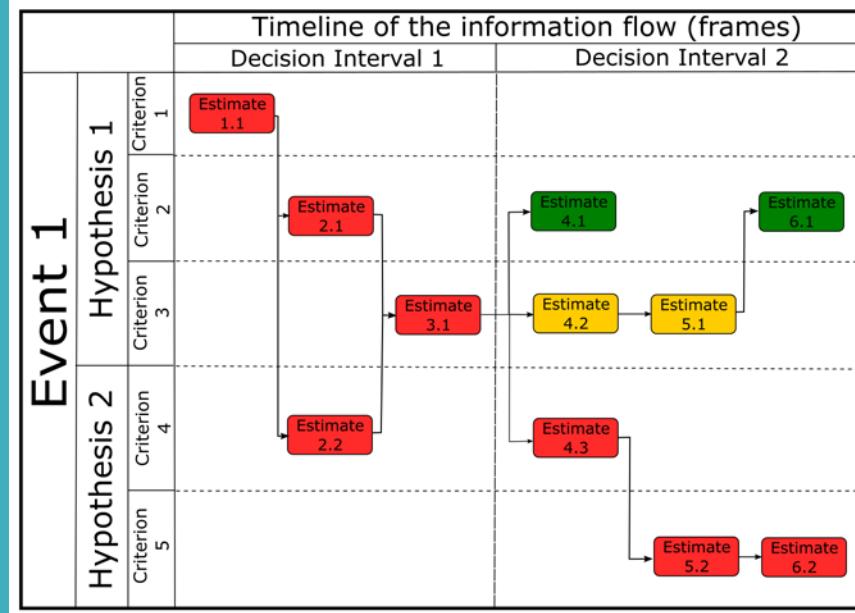
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Probabilistic evolution graph



Theoretical Concept

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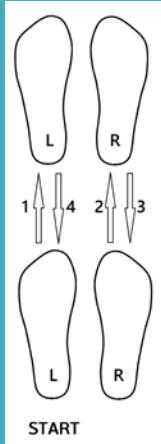
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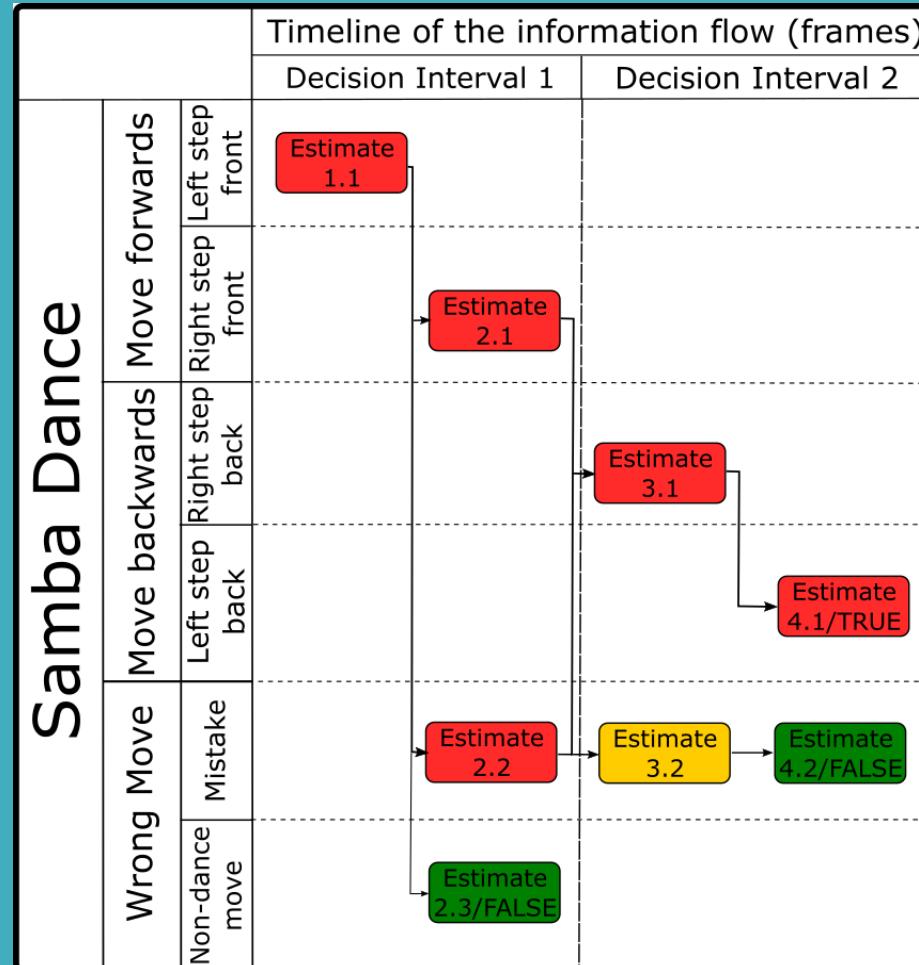
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BASIC SAMBA STEPS



Samba
Dance
Diagram

- ### Hypotheses
- Move Forwards
 - Move Backwards
 - Other Move



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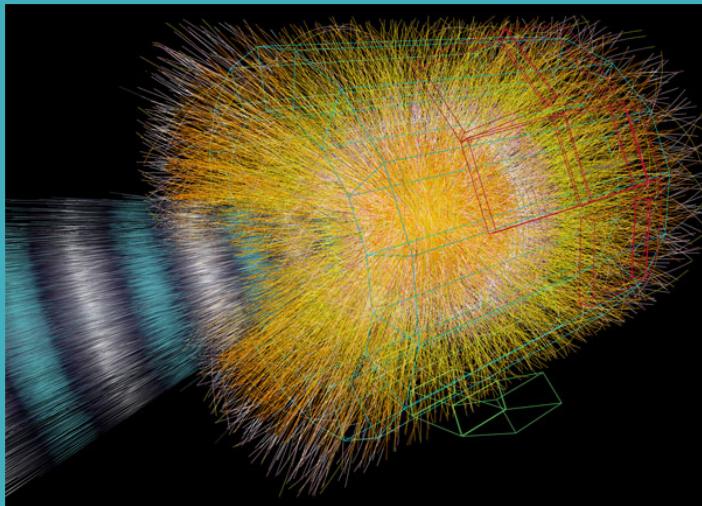
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Technical Realization

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Real Scenario vs Physics



- Low signal to noise ratio
- Rare events
- Lots of data to analyze

Technical Realization

- Real Scenario vs Physics
- What's inside (technologies)



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WHAT'S INSIDE

OPENCV AS BUILDING BLOCKS

- Image processing, FFT, Filter2D, VJ-cascade, HOG

UNIQUE DEVELOPMENTS

- Low level signal subtraction (applying the scientific methods from experimental nuclear physics to video analysis)
- Accurate motion detection (based on low level signal subtraction)
- Robust tracking algorithm
- Hydrodynamic approach to behavioral analysis
- Neural networks (classic and deep architecture)
- Predictive analysis technology – analysis and prediction of object behavior in the frame

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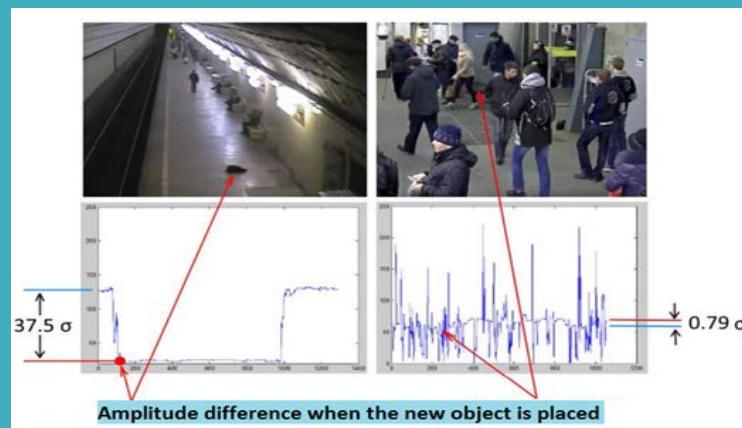
Scene Segmentation

- Background
- Static objects
- Moving objects



Background Removal

- High Sensitivity made possible by extracting useful information from the noise
- Wavelet Analysis



Technical Realization

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Motion Detection & Object Tracking



- Confident detection and tracking of nearly invisible motion,
captured by cheap noisy camera
 - Robust, works in difficult conditions

Technical Realization

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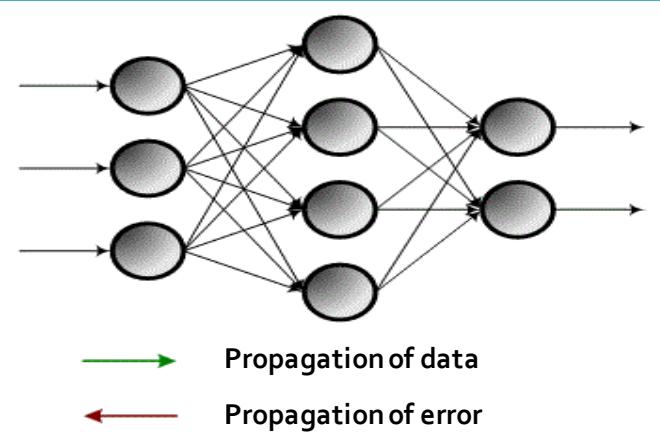


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Predictive Behavioral Analysis Action recognition criteria

- Empirical
- Statistical
- Machine Learning

Tasks with high traffic - hydrodynamic approach



Сейчас не удается отобразить рисунок.

Technical Realization

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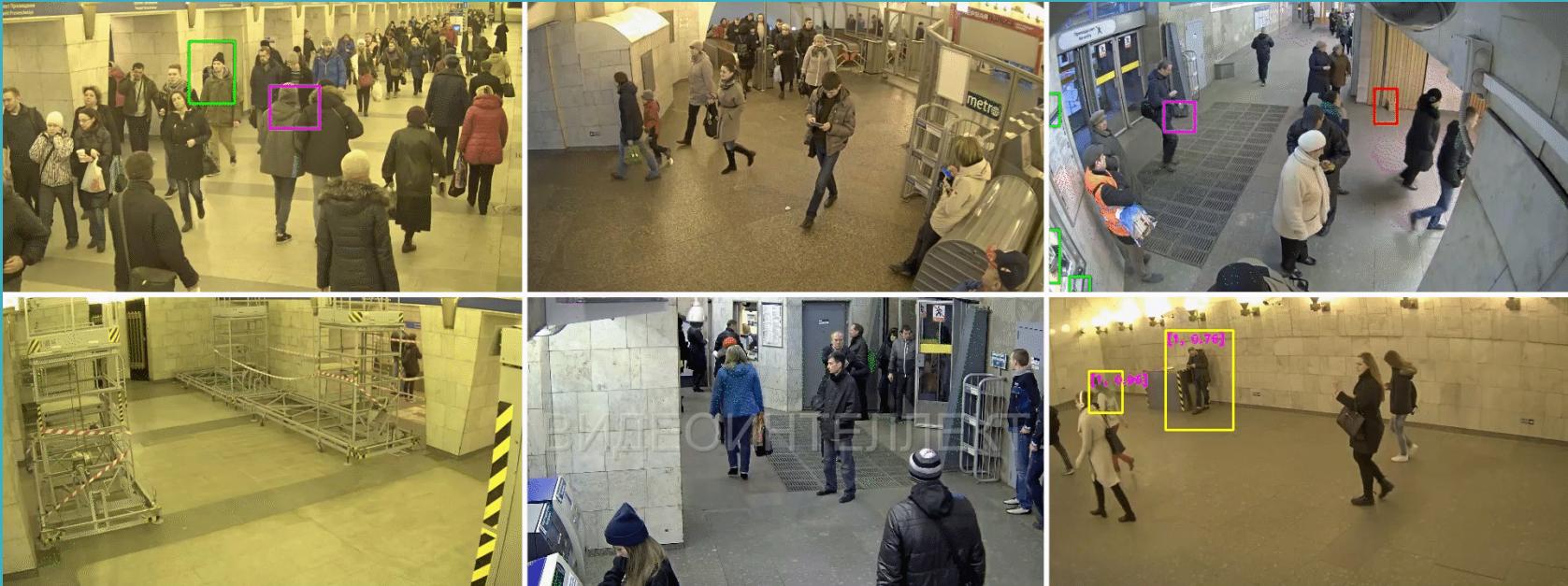
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Projects & Results

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Security system of St.Petersburg metro



Abandoned object detector

- 1 year comparison on effectiveness and efficiency with world's leaders in video analytics (AgentVi Israel, TechnoAware Italy, ITV Axxonsoft Russia).
- Winning project – deployed in 23 stations, to be deployed in whole metro

Projects & Results

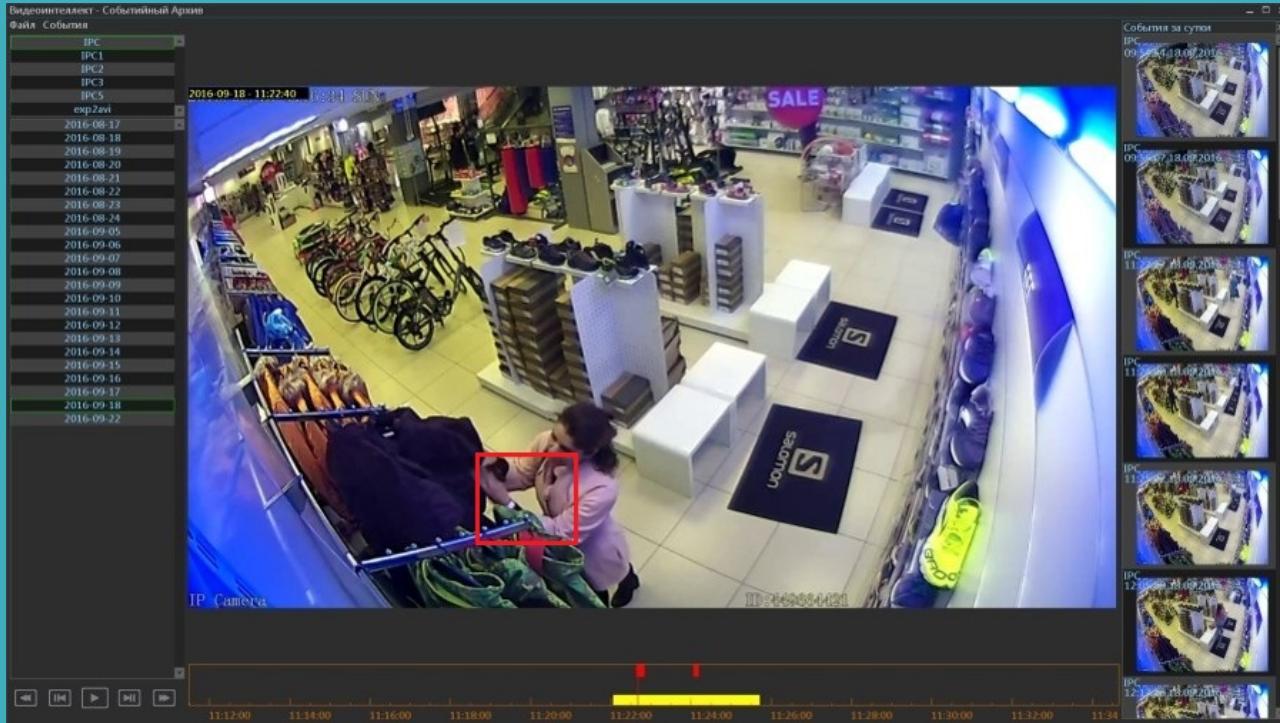
- St.Petersburg metro
- Customer Analytics

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Projects & Results

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Customer Analytics



- Monitoring visitors to detect when they are ready for purchase
 - Detects and tracks changes in fine motorics

Projects & Results

- St.Petersburg metro
- Customer Analytics



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Projects & Results

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Thank You !

Q & A

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