

# **Semantyczna analiza środowiska**

## **przez robota usługowego**

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# Agenda

1. Wstęp teoretyczny
2. Cel pracy
3. Założenia
4. Motywacje
5. Zbiór danych
6. Przegląd rozwiązań
7. Zaproponowane rozwiązanie
8. Titleformats  
Tricks
9. Elements
10. Conclusion

## **Wstęp teoretyczny**

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# Klasyfikacja sceny



**Figure 1:** Problem różnorodności wewnętrzklasowej oraz wieloznaczności semantycznej [7].

# Segmentacja obrazu



Figure 2: Segmentacja wewnętrz pomieszczeń [8].

## Cel pracy

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# Cel

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- Zrozumienie środowiska wewnętrz budynku
- Klasifikacja pomieszczeń

# Założenia

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# Założenia

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- Środowisko wewnątrz budynków, domowe
- Inferencja na robocie Tiago (MS Kinect)

## Motywacje

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- Nawigacja robota
  - Wykrywanie przeszkód
  - Zmiana zachowania pod wpływem znajdującego się pomieszczenia
- Przewodnik dla osób niewidomych
- Predykcja afodrancji

## Zbiór danych

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Wymagania:

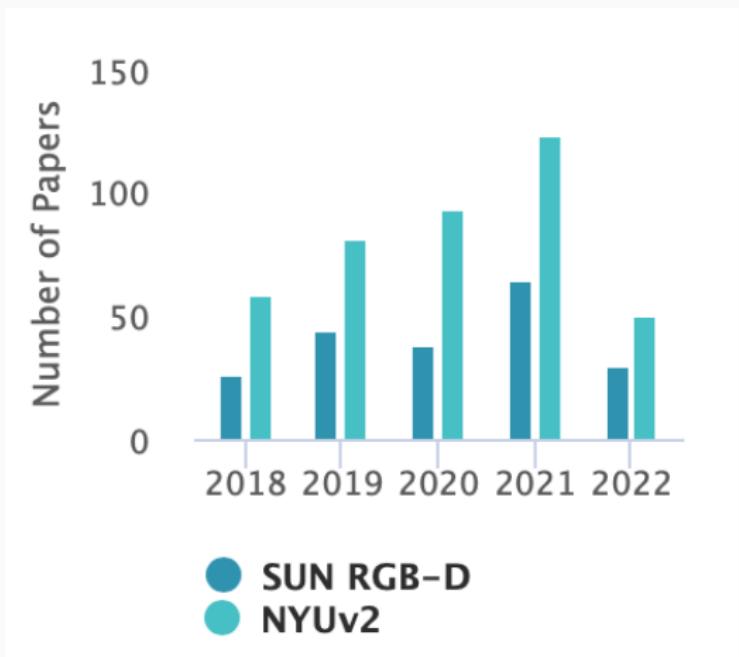
- MS Kinect
- Kategorie scen
- Maski obiektów

# Zbiór danych

Nazwa	# Ilość	# Klas obiektów	# Klas scen	RGB-D	Rozdzielczość	# Czujników	Nieposprzątane
NYUv2	1 449	894	26	✓	640 x 480	1	✓
SUN RGBD	10 335	800	47	✓	640 x 480	4	x

**Table 1:** Porównanie zbiorów danych [5],[4]

## Zbiór danych

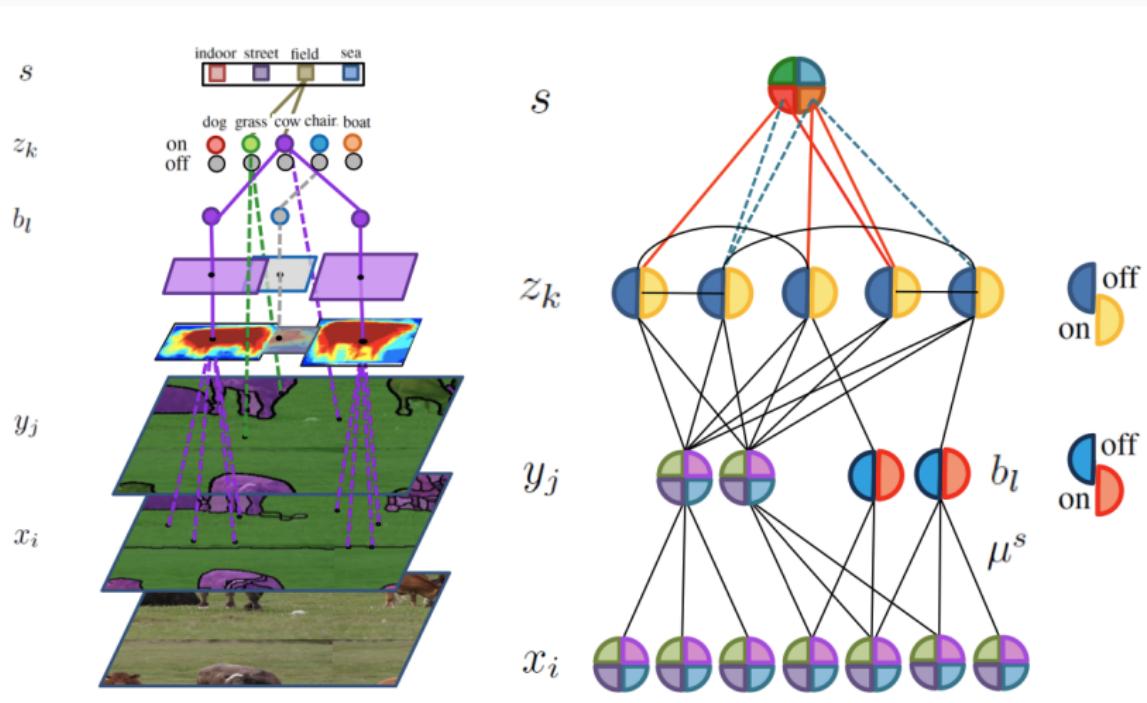


**Figure 3:** Szacowana liczba cytowań w latach 2018-2022 [paperswithcode.com]

## Przegląd rozwiązań

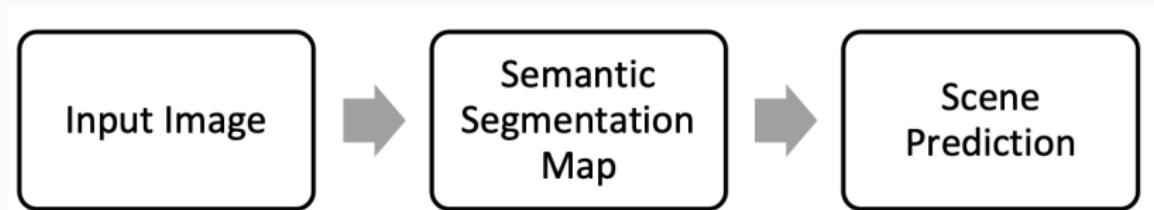
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# Przegląd rozwiązań



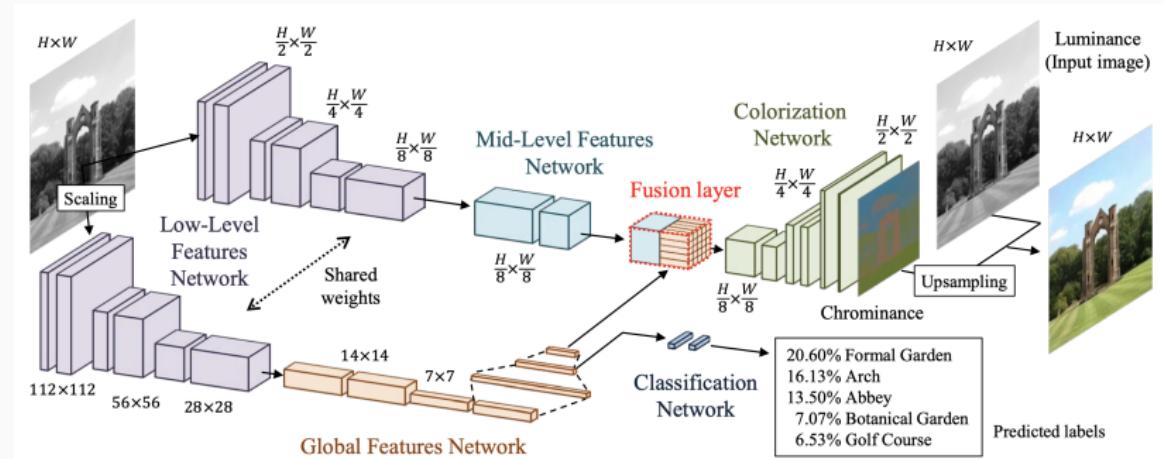
**Figure 4:** Describing the Scene as a Whole: Joint Object Detection, Scene Classification and Semantic Segmentation 2012 [6].

# Przegląd rozwiązań



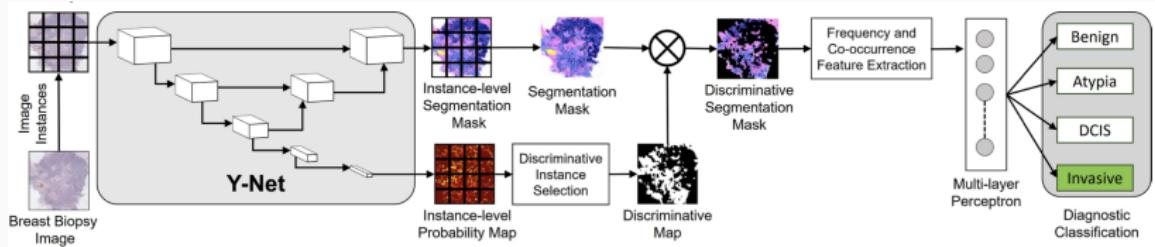
**Figure 5:** Semantic segmentation as image representation for scene recognition 2014 [1].

# Przegląd rozwiązań



**Figure 6:** Let there be Color!: Joint End-to-end Learning of Global and Local Image Priors for Automatic Image Colorization with Simultaneous Classification 2016 [2].

# Przegląd rozwiązań



**Figure 7:** Y-Net: Joint Segmentation and Classification for Diagnosis of Breast Biopsy Images 2018 [3].

## Zaproponowane rozwiązanie

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# Zaproponowane rozwiązanie

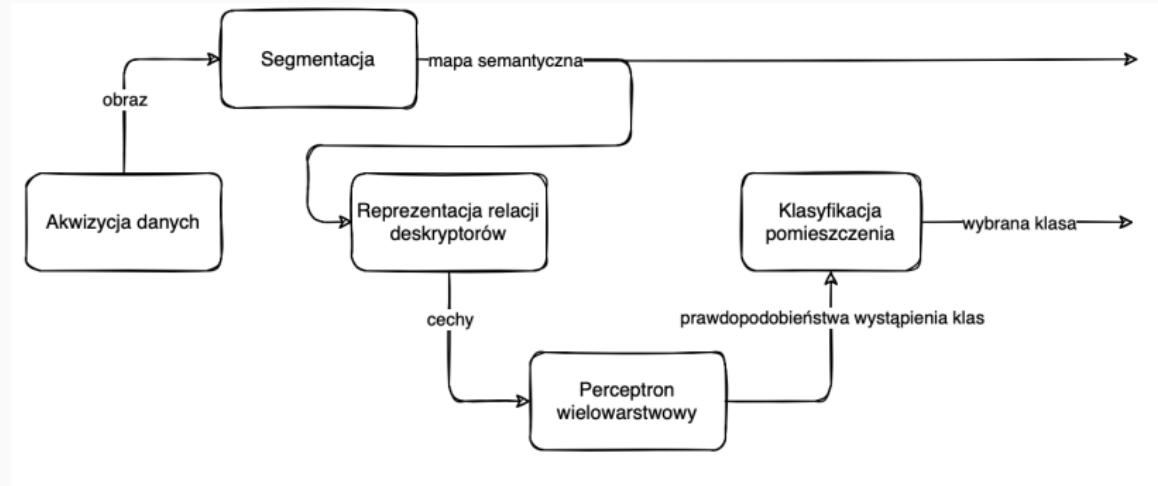


Figure 8: Prototyp rozwiązania.

-  A. Bassiouny and M. El-Saban.  
**Semantic segmentation as image representation for scene recognition.**  
In *2014 IEEE International Conference on Image Processing (ICIP)*, pages 981–985. IEEE, 2014.
-  S. Iizuka, E. Simo-Serra, and H. Ishikawa.  
**Let there be color! joint end-to-end learning of global and local image priors for automatic image colorization with simultaneous classification.**  
*ACM Transactions on Graphics (ToG)*, 35(4):1–11, 2016.

## Bibliografia ii

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-  S. Mehta, E. Mercan, J. Bartlett, D. Weaver, J. G. Elmore, and L. Shapiro.  
**Y-net: joint segmentation and classification for diagnosis of breast biopsy images.**  
In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pages 893–901. Springer, 2018.
-  N. Silberman, D. Hoiem, P. Kohli, and R. Fergus.  
**Indoor segmentation and support inference from rgbd images.**  
In *European conference on computer vision*, pages 746–760. Springer, 2012.
-  S. Song, S. P. Lichtenberg, and J. Xiao.  
**Sun rgb-d: A rgbd scene understanding benchmark suite.**  
In *Proceedings of the IEEE conference on computer vision and pattern recognition*, pages 567–576, 2015.

## Bibliografia iii

-  J. Yao, S. Fidler, and R. Urtasun.  
**Describing the scene as a whole: Joint object detection, scene classification and semantic segmentation.**  
In *2012 IEEE conference on computer vision and pattern recognition*, pages 702–709. IEEE, 2012.
-  D. Zeng, M. Liao, M. Tavakolian, Y. Guo, B. Zhou, D. Hu, M. Pietikäinen, and L. Liu.  
**Deep learning for scene classification: A survey.**  
*arXiv preprint arXiv:2101.10531*, 2021.
-  H. Zhang, K. Dana, J. Shi, Z. Zhang, X. Wang, A. Tyagi, and A. Agrawal.  
**Context encoding for semantic segmentation.**  
In *Proceedings of the IEEE conference on Computer Vision and Pattern Recognition*, pages 7151–7160, 2018.

The **metropolis** theme is a Beamer theme with minimal visual noise inspired by the hsrM Beamer Theme by Benjamin Weiss.

Enable the theme by loading

```
\documentclass{beamer}  
\usepackage{metropolis}
```

Note, that you have to have Mozilla's *Fira Sans* font and XeTeX installed to enjoy this wonderful typography.

# Sections

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Sections group slides of the same topic

```
\section{Elements}
```

for which **metropolis** provides a nice progress indicator ...

## Titleformats

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# Metropolis titleformats

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**metropolis** supports 4 different titleformats:

- Regular
- Smallcaps
- allsmallcaps
- ALLCAPS

They can either be set at once for every title type or individually.

# Small caps

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This frame uses the `smallcaps` titleformat.

## Potential Problems

Be aware, that not every font supports small caps. If for example you typeset your presentation with pdfTeX and the Computer Modern Sans Serif font, every text in `smallcaps` will be typeset with the Computer Modern Serif font instead.

This frame uses the `allsmallcaps` titleformat.

### Potential problems

As this titleformat also uses `smallcaps` you face the same problems as with the `smallcaps` titleformat. Additionally this format can cause some other problems. Please refer to the documentation if you consider using it.

As a rule of thumb: Just use it for plaintext-only titles.

# ALL CAPS

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This frame uses the `allcaps` titleformat.

## Potential Problems

This titleformat is not as problematic as the `allsmallcaps` format, but basically suffers from the same deficiencies. So please have a look at the documentation if you want to use it.

## Elements

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# Typography

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The theme provides sensible defaults to  
\emph{emphasize} text, \alert{accent} parts  
or show \textbf{bold} results.

becomes

The theme provides sensible defaults to *emphasize* text, **accent** parts or  
show **bold** results.

# Font feature test

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- Regular
- *Italic*
- SmallCaps
- Bold
- ***Bold Italic***
- **SmallCaps**
- Monospace
- *Monospace Italic*
- Monospace Bold
- *Monospace Bold Italic*

# Lists

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Items	Enumerations	Descriptions
• Milk	1. First,	<b>PowerPoint</b> Meeh.
• Eggs	2. Second and	<b>Beamer</b> Yeeeha.
• Potatos	3. Last.	

# Animation

---

- This is important

# Animation

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- This is important
- Now this

# Animation

---

- This is important
- Now this
- And now this

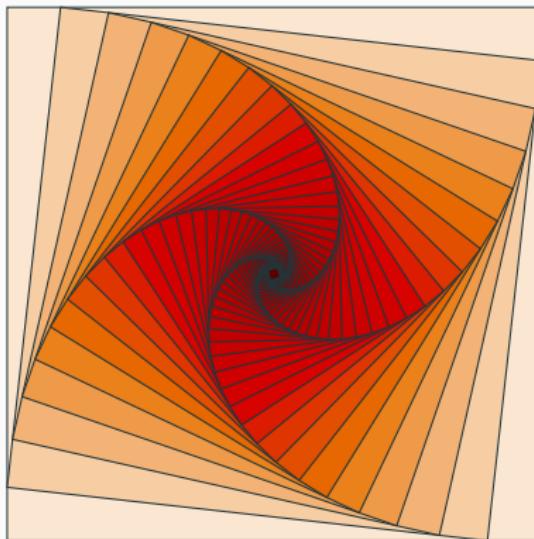
# Animation

---

- This is really important
- Now this
- And now this

# Figures

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**Figure 9:** Rotated square from [texample.net](http://texample.net).

# Tables

**Table 2:** Largest cities in the world (source: Wikipedia)

City	Population
Mexico City	20,116,842
Shanghai	19,210,000
Peking	15,796,450
Istanbul	14,160,467

# Blocks

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Three different block environments are pre-defined and may be styled with an optional background color.

## Default

Block content.

## Alert

Block content.

## Example

Block content.

## Default

Block content.

## Alert

Block content.

## Example

Block content.

# Quotes

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*Veni, Vidi, Vici*

**metropolis** defines a custom beamer template to add a text to the footer. It can be set via

```
\setbeamertemplate{frame footer}{My custom footer}
```

# References

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Some references to showcase [allowframebreaks]

## Conclusion

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# Summary

Get the source of this theme and the demo presentation from

[github.com/matze/mtheme](https://github.com/matze/mtheme)

The theme *itself* is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.



**Questions?**

## Backup slides

Sometimes, it is useful to add slides at the end of your presentation to refer to during audience questions.

The best way to do this is to include the `appendixnumberbeamer` package in your preamble and call `\appendix` before your backup slides.

**metropolis** will automatically turn off slide numbering and progress bars for slides in the appendix.