**Subject**

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| Robot Exploration in Unknown Environment |

**Research question**

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| What are the differences in methods which could be used for robot exploration? |

**Databases**

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| * SmartCat, * Web of Science * Google Scholar |

**Known items (Provided by supervisor)**

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| http://wiki.ros.org/frontier\_exploration (Frontier Exploration)  http://wiki.ros.org/gmapping (Gmapping)  More will follow, since these are too detailed. |

**Search terms and questions**

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| Robotics  Systems  Mapping  Exploration  Reinforcement learning  Machine learning  Time-budgeting  Unknown environment |

**Search string**

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| **Basic**  Robotics AND Mapping  Robotics AND Exploring  Robotics AND Reinforcement learning  Robotics AND Machine Learning  Mapping AND Unknown environment  Discovering OR Exploring  **Advanced**  Robotics AND (Mapping OR Exploring) AND (Environment)  Robotics AND (Reinforcement learning OR Machine Learning) |

**Sources found**

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| **Search-term in SmartCat:** *Robotics AND (Mapping OR Exploring) AND Environment (sort on best match)*  **Result:** Burgard, W., Brock, O., & Stachniss, C. (2008*). Robotics : science and systems iii.* MIT Press. Retrieved 2022, from INSERT-MISSING-URL.  **Abstract:** Proceedings from the third annual Robotics: Science and Systems conference, presenting state-of-the-art research on the foundations of robotics, robotics applications, and robotics systems.Robotics: Science and Systems III spans a wide spectrum of robotics, bringing together researchers working on the foundations of robotics, robotics applications, and analysis of robotics systems. This volume presents the proceedings of the third annual Robotics: Science and Systems conference, held in June 2007 at Georgia Tech. Papers report state-of-the-art research on topics as diverse as Legged Robotics, Reconfigurable Robots, Biomimetic Robots, Manipulation, Humanoid Robotics, Telerobotics, Haptics, Motion Planning, Collision Avoidance, Robot Vision and Perception, Bayesian Techniques, Machine Learning, Mobile Robots, and Multi-robot systems. This conference reflects not only the tremendous growth of robotics as a discipline but also the desire in the robotics community for a flagship event at which the best of the research in the field can be presented.  **Search-term in WoS:** *Robotics AND (Mapping OR Exploring) AND Environment (sort on most cited)*  **Result:** Mur-Artal, R (Mur-Artal, Raul) ; Montiel, JMM (Montiel, J. M. M.) ; Tardos, JD (Tardos, Juan D.), *ORB-SLAM: A Versatile and Accurate Monocular SLAM System.* IEEE Transactions on Robotics  **Abstract:** This paper presents ORB-SLAM, a feature-based monocular simultaneous localization and mapping (SLAM) system that operates in real time, in small and large indoor and outdoor environments. The system is robust to severe motion clutter, allows wide baseline loop closing and relocalization, and includes full automatic initialization. Building on excellent algorithms of recent years, we designed from scratch a novel system that uses the same features for all SLAM tasks: tracking, mapping, relocalization, and loop closing. A survival of the fittest strategy that selects the points and keyframes of the reconstruction leads to excellent robustness and generates a compact and trackable map that only grows if the scene content changes, allowing lifelong operation. We present an exhaustive evaluation in 27 sequences from the most popular datasets. ORB-SLAM achieves unprecedented performance with respect to other state-of-the-art monocular SLAM approaches. For the benefit of the community, we make the source code public.  **Searh-term in Google Scholar:** Robotics AND (Reinforcement learning OR Machine Learning) (sort on relevance)  **Result:** Kormushev, P., Calinon, S., & Caldwell, D. G. (2013). Reinforcement learning in robotics: Applications and real-world challenges. Robotics, 2(3), 122-148.  **Abstract:** In robotics, the ultimate goal of reinforcement learning is to endow robots with the ability to learn, improve, adapt and reproduce tasks with dynamically changing constraints based on exploration and autonomous learning. We give a summary of the state-of-the-art of reinforcement learning in the context of robotics, in terms of both algorithms and policy representations. Numerous challenges faced by the policy representation in robotics are identified. Three recent examples for the application of reinforcement learning to real-world robots are described: a pancake flipping task, a bipedal walking energy minimization task and an archery-based aiming task. In all examples, a state-of-the-art expectation-maximization-based reinforcement learning is used, and different policy representations are proposed and evaluated for each task. The proposed policy representations offer viable solutions to six rarely-addressed challenges in policy representations: correlations, adaptability, multi-resolution, globality, multi-dimensionality and convergence. Both the successes and the practical difficulties encountered in these examples are discussed. Based on insights from these particular cases, conclusions are drawn about the state-of-the-art and the future perspective directions for reinforcement learning in robotics.  **Search-terms in SmartCat:** Robotics AND (Reinforcement learning OR Machine Learning) (sort on relevance)  **Result:** Bonsignorio, F., Hsu, D., Johnson-Roberson, M., &amp; Kober, J. (2020). Deep learning and machine learning in robotics [from the guest editors]. Ieee Robotics and Automation Magazine, 27(2), 20–21. https://doi.org/10.1109/MRA.2020.2984470  **Abstract:** - |

**Review article motivation**

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| **The review article is handed in as a separate article.**  **Abstract:** This article describes the software architecture of an autonomous, interactive tour-guide robot. It presents a modular and distributed software architecture, which integrates localization, mapping, collision avoidance, planning, and various modules concerned with user interaction and Web-based telepresence. At its heart, the software approach relies on probabilistic computation, on-line learning, and any-time algorithms. It enables robots to operate safely, reliably, and at high speeds in highly dynamic environments, and does not require any modifications of the environment to aid the robot's operation. Special emphasis is placed on the design of interactive capabilities that appeal to people's intuition. The interface provides new means for human-robot interaction with crowds of people in public places, and it also provides people all around the world with the ability to establish a "virtual telepresence" using the Web, To illustrate our approach, results are reported obtained in mid-1997, when our robot "RHINO" was deployed for a period of six days in a densely populated museum. The empirical results demonstrate reliable operation in public environments. The robot successfully raised the museum's attendance by more than 50%. In addition, thousands of people all over the world controlled the robot through the Web. We conjecture that these innovations transcend to a much larger range of application domains for service robots. (C) 1999 Elsevier Science B.V. All rights reserved.  **Motivation**: This review article is related to my project, since it involves Autonomous Robotics. Moreover, this is within an indoor environment, namely a museum. In the review article is elaborated that it involves modular and distributed software architecture, which integrates localization, mapping, collision avoidance, planning and more. These are all interdisciplinary subject which I will encounter in my own project. |