SLAM can be classified into the following:

The Filter-based approach which is the classical approach that performs prediction and update steps recursively. It maintains information about the environment and the states of the robot as a probability density function. This includes all the Kalman filter family (EKF, UKF, SEIF, etc.) in addition to the particle filter (RBPF) as well.

The global optimization approach is based on saving some keyframes in the environment and uses bundle adjustment to estimate the motion. This is currently a popular approach for vision-based SLAM such as ORB-SLAM which is mentioned earlier and also Google's cartographer. GraphSLAM can also be included under this category.

Convolutional neural networks SLAM which is currently available as RatSLAM and proved in some situations to have superior performance.

Each of the different approaches is suited to a certain combination of (robot, environment, sensors) so it will be difficult to benchmark all the methods.

In recent years, SLAM using cameras only has been actively discussed because the sensor configuration is simple and the technical difficulties are higher than others. Since the input of such SLAM is visual information only, the technique is specifically referred to as visual SLAM (vSLAM). vSLAM algorithms have widely proposed in the field of computer vision, robotics.

GMapping, Hector SLAM, Cartographer lidar-based methods.
Monocular slam algorithms can be divided into two groups, those who use feature-based methods and those who use direct methods. Feature-based slam algorithms take the images and within these images, they search for certain features, key-points, (for instance corners), and only use these features to estimate the location and surroundings ex. (ORB SLAM, RTAB map, S-PTAM). Direct slam algorithms do not

search the image for key-points but instead use the image intensities to estimate the location and surroundings ex. (LSD SLAM, DSO).
By using RGB-D cameras, the 3D structure of the environment with its texture information can be obtained directly. In addition, in contrast to monocular vSLAM algorithms (ORB), the scale of the coordinate system is known because the 3D structure can be acquired in the metric space.

SLAM algorithms suitable for different situations:

For 2D laser scanners: RBPF algorithms like GMapping are used and the map type would be the Occupancy grid.

For Features/Landmarks observations: Kalman filter and Bundle adjustment algorithms can be used with landmark type.

Given a landmark map and observations from range only sensors, RO-SLAM algorithms can be used.

For a map type of graph with pose constraints and observations of relative poses, we can use graph slam algorithms or bundle adjustment algorithms.

Keeping in mind that we are going to work on a mobile robot in indoor environment, we chose RGB-D Slam as we discussed that the technical difficulties in sensor-based algorithms and how vSlam algorithms are being considered in recent years. Also, RBG-D over ORB due to the low cost of simple RGB-D cameras.

Coming to choosing a dataset, to perform RGB-D slam, we chose TU Munich’s dataset for RGB-D slam which is used for indoor environments and mobile robots. However, we need to iterate through other possible datasets too.