LITERATURE SURVEY

1. Peter Bartlett1et al (2022) determined the species using AI machine-learning algorithms. The genus Hebeloma was renowned as difficult when it comes to species determination. Historically, many dichotomous keys have been published and used with varying success rate. Over the last 20 years the authors have built a database of Hebeloma collections containing not only metadata but also parametrized morphological descriptions, where for about a third of the cases micromorphological characters have been analysed and are included, as well as DNA sequences for almost every collection. The database now has about 9000 collections including nearly every type collection worldwide and represents over 120 different taxa. Almost every collection has been analysed and identified to species using a combination of the available molecular and morphological data in addition to locality and habitat information. Based on these data an Artificial Intelligence (AI) machine-learning species identifier has been developed that takes as input locality data and a small number of the morphological parameters. Using a random test set of more than 600 collections from the database, not utilised within the set of collections used to train the identifier, the species identifier was able to identify 77% correctly with its highest probabilistic match, 96% within its three most likely determinations and over 99% of collections within its five most likely determinations. They used the Hebeloma species as a study case and found that any species with sufficient datasets will find the best algorithm for processing it. This technique not only achieves good accuracy in identifying the species of a given collection but also has huge advantages over traditional single-access keys and multi-access keys.

2. Blount D et al (2022) developed Flukebook, an open-source AI platform for cetacean photo identification. They determined which species are at greatest risk, where they are most vulnerable, and what were the trajectories of their communities and populations critical for conservation and management. Globally distributed, wide-ranging whales and dolphins present a particular challenge in data collection because no single research team can record data over biologically meaningful areas. Flukebook.org is an open-source web platform that addresses these gaps by providing researchers with the latest computational tools. It is an extensible foundation that continually incorporates emerging AI techniques and applies them to cetacean photo identification through continued collaboration between computer vision researchers, software engineers, and biologists. With over 2.0 million photos of over 52,000 identified individual animals submitted by over 250 researchers, the platform enables a comprehensive understanding of cetacean populations, fostering international and cross-institutional collaboration while respecting data ownership and privacy. This computer vision pipeline works with real-world conditions, allowing for broad contributions from both research professionals and amateur naturalists. This process gives greater confidence that they know what the animals were and where they have

been. Getting this baseline information correct allows government and managers to focus on policies that can bring about actionable change.

3. Hua A et al (2022) developed a method for protecting endangered megafauna through AI analysis of drone images in a low-connectivity setting by doing a case study from Namibia. Assessing the numbers and distribution of at-risk megafauna such as the black rhino (Diceros bicornis) is key to effective conservation, yet such data are difficult to obtain. Many current monitoring technologies are invasive to the target animals and expensive. Satellite monitoring is emerging as a potential tool for very large animals but detecting smaller species requires higher resolution imaging. Drones can deliver the required resolution and speed of monitoring, but challenges remain in delivering automated monitoring systems where internet connectivity is unreliable or absent. They described a model built to run on a drone to identify live images of megafauna. The model was less successful at identifying the other smaller objects which were not our primary targets: 0.34, 0.25, and 0.42 for ostrich (Struthio camelus australis), springbok (Antidorcas marsupialis) and human respectively. They used several techniques to optimise performance and overcome the inherent challenge of small objects (animals) in the data. To constrain model overfitting, they trained the model on a dataset with varied terrain, angle and lighting conditions and used data augmentation techniques. They used image tiling and a relatively larger resolution image input size to compensate for the difficulty faced in detecting small objects when using YOLO. In this study, they demonstrated the potential of a drone-based AI pipeline model to automate the detection of free-ranging megafauna detection in a remote setting and create alerts to a wildlife manager in a relatively poorly connected field environment.

4. Aftab Set al (2022) did Raspberry Pi (Python AI) for Plant Disease Detection. The diagnosis of diseases at an early stage is the main goal of this paper. They concentrate on image processing techniques in this research. This entails a range of processes ranging from taking a picture of the leaves to using Raspberry PI to diagnose the condition. The Raspberry PI is used to connect the camera to the display device, from which the data is sent to the cloud. Various procedures, such as acquisition, pre-processing, segmentation, and clustering, are used to examine the acquired images. As a result, the demand for labour in big farm areas is reduced. Also, the cost and effort are reduced, whereas productivity is increased. Various procedures, such as acquisition, pre-processing, segmentation, and clustering, are used to examine the acquired images. As a result, the demand for labour on huge farmlands is reduced. Costs and efforts are also minimised while production is raised.

5. August T Aet al (2020) conducted a study on AI naturalists that might hold the key to unlocking biodiversity data in social media imagery. The increasing availability of digital images, coupled with sophisticated artificial intelligence (AI) techniques for image classification, presents an exciting opportunity for biodiversity researchers to

create new datasets of species observations. They investigated whether an AI plant species classifier could extract previously unexploited biodiversity data from social media photos and found over 60,000 geolocated images tagged with the keyword “flower” across an urban and rural location in the UK and classified these using AI, reviewing these identifications and assessing the representativeness of images. Images were predominantly biodiversity focused, showing single species. Non-native garden plants dominated, particularly in the urban setting. The AI classifier performed best when photos were focused on single native species in wild situations but also performed well at higher taxonomic levels (genus and family), even when images substantially deviated from this. They also presented a checklist of questions that should be considered when undertaking a similar analysis.

6. Bakker K (2022) published Smart Oceans on Artificial intelligence and marine protected area governance. He analysed a novel example of emerging digitally-driven earth system governance in the field of marine biodiversity conservation. Artificial Intelligence-enabled, mobile marine protected areas (MMPAs) are geographically dynamic, with mobile boundaries which change position as endangered species migrate through the ocean. This real-time, mobile, and potentially spatially ubiquitous form of ocean governance relies on digital hardware that collects data from various sources (e.g. nano-satellites, drones, environmental sensor networks, digital bioacoustics, marine tags, deep sea UAVs), combined with analytics such as machine learning algorithms, computer vision and ecological informatics techniques. MMPAs are justified on the basis of their ability to enable responsive, real-time adaptation to environmental variability, species mobility, and disturbance dynamics; hence, scientists and regulators are increasingly recommending the deployment of these AI-powered computational systems in the world’s oceans.

7. Ibrahim N M A et al (2022) developed a new Deep Learning System for Wild Plants Classification and Species Identification using Leaves and Fruits. Many studies are based on the study of plant classification and their identification using its leaves, and there are many studies to identify plants using its fruits. Most of these studies are based on the leaves of the plant in general as well as the fruits in general as well. In this research, they presented a new tool using artificial intelligence to classify and identify wild plants through the leaves of these plants, or by using their fruits, or by using both leaves and fruits together. This tool has proven an excellent result compared to similar tools in the same field. More than one AI model was applied to three datasets, lower plants dataset (LPDS), upper plant dataset (UPDS), and fruit plant dataset (FPDS). They used machine learning methods to serve in the plant taxonomy and identification. The wild plant's dataset was gathered in its natural habitat in Egypt. The developed convolution neural network model (AlexNet CNN), the Random Forest (RF), and the support vector machine (SVM) techniques were contrasted in the species classifications. The highest degree of accuracy achieved was 98.2% by using the developed CNN model.

8. Reckling W et al (2021) developed efficient Drone-Based Rare Plant Monitoring using a Species Distribution Model and AI-Based Object Detection. Monitoring rare plant species was used to confirm presence, assess health, and verify population trends. Unmanned aerial systems (UAS) are ideal tools for monitoring rare plants because they can efficiently collect data without impacting the plant or endangering personnel. However, UAS flight planning can be subjective, resulting in ineffective use of flight time and overcollection of imagery. This study used a Maxent machine-learning predictive model to create targeted flight areas to monitor Geum radiatum, an endangered plant endemic to the Blue Ridge Mountains in North Carolina. The Maxent model was developed with ten environmental layers as predictors and known plant locations as training data. UAS flight areas were derived from the resulting probability raster as isolines delineated from a probability threshold based on flight parameters. Visual analysis of UAS imagery verified the locations of 33 known plants and discovered four previously undocumented occurrences. Semi-automated detection of plant species was explored using a neural network object detector. Although the approach was successful in detecting plants in on-ground images, no plants were identified in the UAS aerial imagery, indicating that further improvements are needed in both data acquisition and computer vision techniques. Despite this limitation, the presented research provides a data-driven approach to plan targeted UAS flight areas from predictive modelling, improving UAS data collection for rare plant monitoring.