MushDex: A Pathway to Real-Time Detection and Classification of Mushrooms Using Raspberry Pi Zero 2W

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Abstract—This research is looking for a solution that help trekking people, and stimulate the interest of people who like mushrooms in going for a walk in the woods improving their health.

This work provide a smarter and experimental support for trekking peoples, that allow them to focus only on the risk of their journey leaving to MushDex the detection and classification in real-time of mushrooms in the area around.

Index Terms—mushroom, detection, classification.

I. Introduction

In the year 2023 the data provided by Alpine and Speleological Rescue activities show a number of 12,365 people rescued, of which 7,622 injured and 491 deceased [0]. These values increase adding also those providing by the Department of Health Activities, that measured 10 thousand Italians per year, between mild and more serious cases, with symptoms ranging from gastrointestinal problems to neurological complications, up to death.

Unfortunately the events of Covid19 make people more comfortable to stay at home left a little part of their sanity, this improved also for those cases of living in a big cemented city. Making a walk in a forest is very healthy, and also reduce stress. The idea is to use the interest of people in mushrooms to stimulate them to go out for a forest walk in a more safety way. Using MushDex, a person can walk freely of negative thoughts.

We cannot directly solve the problems linked with the environment dangers, this is left to the foresters of the countries. But we can left to people to be more focused on their journey, leaving them free of think of where there should be a mushroom, which is the reason for their trekking. In this way they are more ready to forest dangers.

There are already many available identification of mushrooms applications, but the majority of them are not open source, require payment, and they have no enough accuracy in real-time inference.

In order to achieve the goal, we trained on a PC Desktop the state-of-art network YOLOv10x on a trustful custom dataset, to produce boxes on a dataset of photos obtained by combining MushroomObserver and DanishFungi datasets, creating a new dataset. A weaker architecture, YOLOv10n, is then trained on this dataset created by the previous network. The labels were modified according to the folders containing the photos.

Our challenge is to implement this trained detection program on a pocket-sized device made by a raspberry pi zero2, with 512 MB SDRAM and CPU of 1GHz Quad-Core 64 bit Arm Cortex-A53.

It takes input real time images by a detection camera accompanied by a LED light that lights the area if the intensity is not enough. In this way the hardware can be self-consistence with the environment conditions.

Then it speaks to the user the genus and the specie of belonging.

II. Related Works

There exists already an open source app for the identification of mushrooms from its photo: fungID, but the user still need to detect the mushrooms, make a photo going close and eventually also take it, in this way exposing itself to a possible spore poisoning. Moreover the user reduce its attention on the journey in the forest, because redirected on the mushroom detection, increasing the risk connected to this.

A real-time app also exists: **Riconoscere funghi - Identific**, but it is not based on YOLOv10x and it is really incorrect during this process.

III. Ease of Use

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TABLE I
TABLE TYPE STYLES

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[a]Sample of a Table footnote.

Fig. 1. Example of a figure caption.

example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization $\{A[m(1)]\}$", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K".

ACKNOWLEDGMENT

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