

Veterinary Diagnosis

Introduction

The API `/virtualbot/analysis_image_report/` can also be adapted for Veterinary Diagnosis, assisting veterinarians and animal health professionals in analyzing medical images of animals. By processing images such as X-rays, ultrasounds, or CT scans of animals, the API provides a preliminary diagnosis and generates personalized recommendations based on the findings. This facilitates the early detection of diseases or injuries in animals, improving the quality of veterinary care. It is important to highlight that the API does not store images or clinical information, ensuring the privacy and confidentiality of data.

Functioning of the API `/virtualbot/analysis_image_report`

Endpoint: POST `/virtualbot/analysis_image_report`

Input Parameters:

1. Animal Images: A .zip file containing the images to be analyzed (X-rays, ultrasounds, CT scans, etc.).
2. Animal Data: Basic information in JSON format that may include:
 - Name
 - Species (dog, cat, horse, etc.)
 - Breed
 - Age
 - Gender
 - Clinical history (if available)
3. User Instructions: A JSON specifying the type of analysis requested on the images. For example, whether to detect fractures, internal injuries, organ abnormalities, etc.

Example Request:

```
{  
  "user": "veterinario@clinicaveterinaria.com",  
  "type": "diagnostico_veterinario",  
  "analysis": "Analyze the X-rays to identify possible fractures in the limbs."  
}
```

Example Animal Data:

```
{  
  "nombre": "Max",  
  "especie": "Perro",  
  "raza": "Labrador Retriever",  
}
```

```
"edad": "5",
"género": "Macho",
"historial_clinico": "Accidente reciente, cojea de la pata delantera derecha."
}
```

Process:

1. The API receives the .zip file with the images and the animal data.
2. It uses the clinical history to contextualize the analysis (though it is not mandatory to provide it).
3. It analyzes each image to:
 - Identify injuries or fractures in bones and joints.
 - Detect internal diseases such as tumors, infections, organ abnormalities, etc.
 - Provide a preliminary diagnosis based on the findings.
4. It generates a detailed report of the findings in each image.
5. It provides recommendations based on the findings, such as suggested treatments or further studies.

Output:

A report in JSON format detailing the findings per image and offering recommendations for the treatment or management of the animal.

Example JSON Response:

```
{
  "diagnostico": {
    "imagen_1": "A transverse fracture is identified in the radius of the right front limb.",
    "conclusiones": [
      "The fracture is stable and shows no significant displacement.",
      "No other bone injuries are observed in the limb."
    ],
    "recomendaciones": [
      "Immobilize the limb with a cast or splint.",
      "Administer analgesia according to the weight and species of the animal.",
      "Schedule follow-up X-rays to monitor bone healing."
    ]
  }
}
```

Applications in Veterinary Diagnosis

1. X-ray Analysis to Detect Fractures or Injuries

- Description: The API can analyze animal X-rays to identify fractures, dislocations, joint diseases, and other bone injuries.

- Benefit: Helps veterinarians quickly diagnose injuries, especially in emergency cases, facilitating decision-making regarding appropriate treatment.

2. Evaluation of Ultrasound Images to Detect Internal Diseases

- Description: The API can process abdominal or thoracic ultrasounds to detect abnormalities in internal organs, such as tumors, cysts, inflammations, or fluid accumulation.

- Benefit: Provides support in diagnosing internal diseases, allowing for early interventions and improving the animal's prognosis.

3. Detection of Respiratory or Cardiac Diseases

- Description: By analyzing chest X-rays, the API can identify signs of lung, heart, or mediastinal diseases.

- Benefit: Facilitates the detection of conditions that may be critical to the animal's health, allowing timely management.

4. Monitoring Animals Under Treatment

- Description: The API can be used to compare images taken at different times, assessing the evolution of an injury or disease.

- Benefit: Helps veterinarians adjust treatments and evaluate the effectiveness of interventions.

Practical Examples of API Use

Example 1: Detection of Fractures in a Cat

Request:

- Instructions: "Analyze the X-rays to identify possible fractures in the cat's pelvis."

Animal Data:

```
{  
  "nombre": "Luna",  
  "especie": "Gato",  
  "raza": "Siames",  
  "edad": "3",  
  "género": "Hembra",  
  "historial_clinico": "Atropello reciente, dolor en la zona pélvica."  
}
```

API Response:

```
{
  "diagnostico": {
    "imagen_1": "Multiple fractures are observed in the right ilium and pubis.",
    "conclusiones": [
      "The fractures show displacement and require surgical intervention.",
      "Possible involvement of adjacent soft tissues."
    ],
    "recomendaciones": [
      "Refer for veterinary orthopedic surgery.",
      "Perform additional evaluation of internal organs to rule out associated injuries.",
      "Provide analgesia and stabilization until surgery."
    ]
  }
}
```

Example 2: Detection of Liver Disease in a Horse

Request:

- Instructions: "Analyze the abdominal ultrasound to detect abnormalities in the liver."

Animal Data:

```
{
  "nombre": "Spirit",
  "especie": "Caballo",
  "raza": "Pura Sangre",
  "edad": "7",
  "género": "Macho",
  "historial_clinico": "Pérdida de peso y apatía en las últimas semanas."
}
```

API Response:

```
{
  "diagnostico": {
    "imagen_1": "The liver shows increased echogenicity and irregular borders, indicative of chronic liver disease.",
    "conclusiones": [
      "Possible liver fibrosis or cirrhosis.",
      "Requires confirmation through additional tests."
    ],
    "recomendaciones": [
```

```
"Perform blood tests to evaluate liver function.",  
"Implement specialized diet and constant monitoring.",  
"Consider liver biopsy for definitive diagnosis."  
]  
}  
}
```

Advantages of Using the API in Veterinary Diagnosis

1. Support for Early Diagnosis

- Description: The API helps quickly identify injuries and diseases, allowing for timely interventions.
- Benefit: Improves the prognosis and quality of life for animals under veterinary care.

2. Efficiency and Time Savings

- Description: Automates part of the image analysis process, freeing up time for veterinarians to focus on treatment and direct care.
- Benefit: Increases productivity in veterinary clinics and improves customer service.

3. Automated Second Opinion

- Description: Provides additional analysis that can complement the veterinarian's assessment, especially in complex cases.
- Benefit: Increases diagnostic accuracy and confidence in clinical decisions.

4. Personalization of Recommendations

- Description: Generates suggestions tailored to the specific species and condition of the animal, considering the particularities of each case.
- Benefit: Facilitates the creation of more effective and personalized treatment plans.

5. Does Not Store Sensitive Information

- Description: The API does not retain images or personal data, ensuring confidentiality and privacy of information.
- Benefit: Complies with ethical and legal standards, maintaining the trust of owners and professionals.

6. Improvement in Veterinary Care

- Description: By streamlining diagnosis and providing analysis support, it enhances the quality of veterinary service.
- Benefit: Increases client satisfaction and the well-being of treated animals.

Summary

The API /virtualbot/analysis_image_report is an adaptable tool for Veterinary Diagnosis, providing support to veterinarians in analyzing medical images of animals. By offering preliminary diagnoses and recommendations based on image findings and clinical history, the API facilitates early detection of diseases and injuries, improving the quality and efficiency of veterinary care. Its implementation in veterinary clinics and hospitals contributes to more precise and timely care for animals, benefiting both professionals and owners.