Interactive VetMap of Austria

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Abstract

Comprehensive veterinary care is of central importance for animal health in agriculture. However, veterinary services are often unavailable at night and on weekends. To better represent availability and deploy existing resources more efficiently, we collected publicly available data on veterinary practices in Austria and stored them in a continuously updated database. To make this information accessible, we integrated it into a web app based on OpenStreetMap, providing relevant information for both animal owners and veterinarians. The app allows users to visualize the structure of veterinary services across Austria and to find the nearest available practices. Route planning is based on real street distances and travel times, computed using the Open Source Routing Machine (OSRM), ensuring that geographical constraints such as mountain passes or river crossings are properly accounted for. The system is designed to be extensible, with future versions planned to incorporate real-time availability updates, veterinary specializations, and seasonal road conditions.

1 Introduction and Motivation

Reliable veterinary care across both livestock and companion animal medicine is an important socio-political challenge. Structural changes in agriculture and the veterinary profession are putting increasing pressure on the existing system. While coverage during regular practice hours is still guaranteed, the system reaches its limits at night and on weekends. It is therefore a primary goal to deploy available resources as efficiently as possible, taking into account information such as vacations, sick leave, or other absences. Furthermore, unlike human medicine, veterinary medicine lacks fixed structures such as round-the-clock emergency stations. Veterinary practices are staffed only during regular office hours, while on-call duty is arranged individually and may vary from day to day.

Existing services, such as the veterinarian search provided by the Austrian Veterinary Chamber[1] or the insurer Anicura[2], provide addresses but no further information. The present work therefore aims to provide a comprehensive database of veterinary services across Austria and to make it publicly available. The work was partly inspired by the *pharmacy finder app* of the Austrian Apothekerkammer[3]. The information was collected from publicly available sources and is visualized using OpenStreetMap. The result is a continuously updated database, publicly accessible to both

[1]https://www.tieraerztekammer.at/oeffentlicher-bereich/kurz-menue/tierarzt-suche
[2]https://www.anicura.at/
[3]https://www.apothekerkammer.at/

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animal owners and veterinarians at https://vetfind.at. The main contributions of this paper are the establishment of a database of veterinary practices in Austria, the computation of their GPS coordinates, and the integration of this information into an interactive platform, making it easily accessible to animal owners and veterinarians alike.

2 Map and Website

In total information about 1,439 practices clinics have been collected (no guarantee for correctness and completement), where for each practice the following information is stored in a database:

- Name of practice
- Website
- E-mail
- Phone
- Address
- Federal state
- GPS coordinates

The GPS coordinates (longitude and latitude) were retrieved via the *Nominatim geocoding API*[4]. In addition, we captured – if available – relevant information such as specialization (small animal, livestock, horses, etc.) and opening hours.

To this end, we present this information as an interactive map based on OpenStreetMap [8]. Users can search for the nearest available practices by entering an exact address, using their automatically estimated GPS position, or selecting a location directly on the map. Results are displayed either as the ten closest practices or as all practices within a predefined radius. Hovering over a result reveals more detailed information about the practice; additionally, the route to the selected destination can be computed, and a textual route description is provided. An overview of the web-app, which can be called via vetfind.at is shown in Fig. 1.

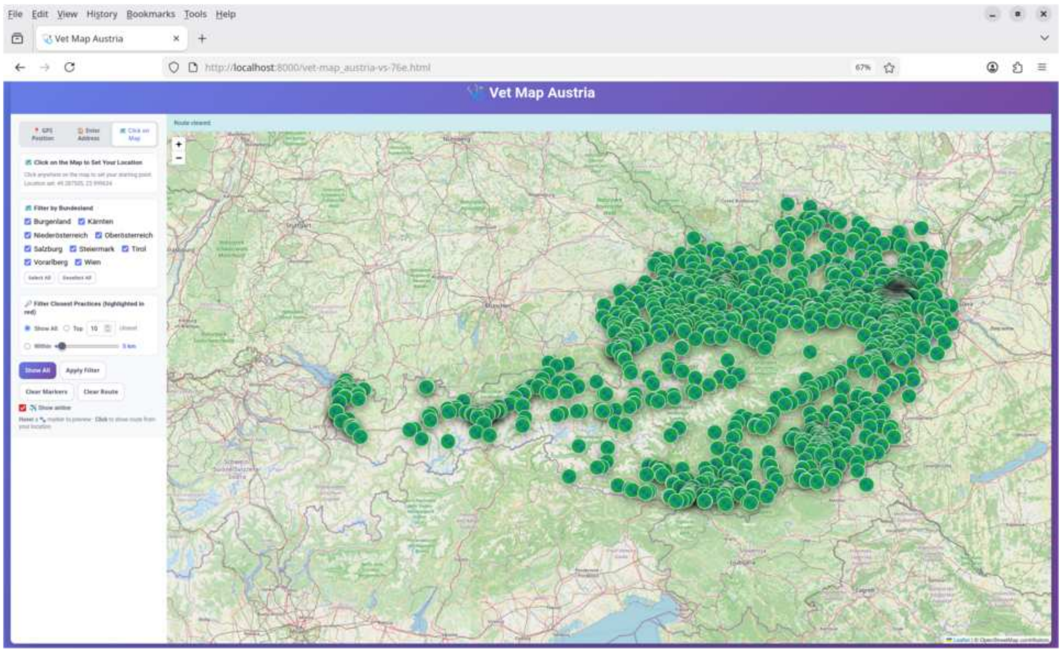


Figure 1: VetMap Austria: Interactive Map showing all veterinary practices in Austria.

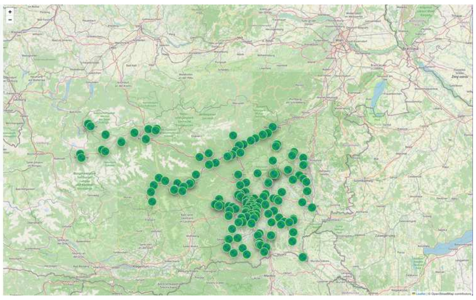
[4] https://operations.osmfoundation.org/policies/nominatim/ (accessed March 1, 2026)

3 Applications

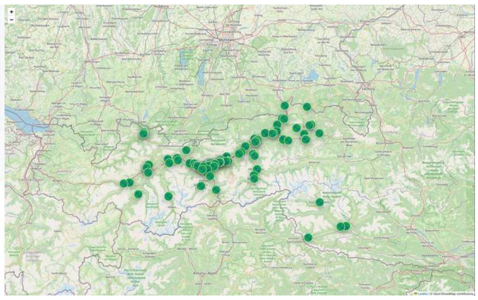
Based on the availale information, we identified different use cases for practical applications, which are discussed in the following:

3.1 Analyze Veterinary Service Structure

The visualization of practice locations provides insight into the structure of veterinary services across Austria. In the current version, the distribution of practices can be directly visualized, revealing the influence of geographical constraints. This is illustrated for Styria in Fig. 2a and Tyrol in Fig. 2b. In Styria, a dense network of practices is visible in the Ennstal, the Mur-Mürz-Furche corridor, and the southern part of the region. Similarly, in Tyrol most practices are concentrated in the Inntal, with only a small number available in the surrounding smaller valleys. Taking additionally into account the size of practices and the age of their employees, more detailed predictions of future service distribution would be possible; however, these data are either not yet available or have not yet been incorporated into the model.



(a) Veterinary practices in Styria.



(b) Veterinary practices in Tyrol.

Figure 2: Illustration of different route visualisations.

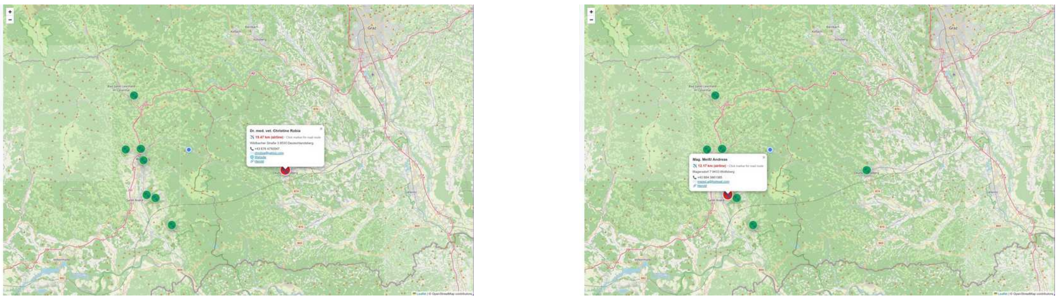
3.2 Getting Close Practices

The user's current position can be specified in three ways: entering an address into a search field, using the automatically determined GPS position, or selecting a location directly on the map. The web app is designed to work on both desktop computers and mobile devices, and can access the device's GPS sensor directly where available. Once the user's position has been determined, the nearest practices are displayed on the map, either within a specified range (in km) or as the top n closest results.

The locations of animal owners and those of available practices are modelled in a graph-based framework, where the street distance or travel time serves as the optimality criterion, computed using OSRM (Open Source Routing Machine; [6]). The models used are, however, flexible enough to incorporate further criteria in the future, such as seasonal parameters, real-time availability updates, or required veterinary expertise. Additionally, the particular challenges in Austria – such as long travel distances due to natural obstacles like mountains or rivers, high-altitude farms with alpine pasture farming, or seasonal restrictions due to road closures or lack of winter road maintenance – must be taken into account. Studies such as [3] that additionally consider the relevance of geo-information or the nature and severity of the emergency at hand remain rare. We therefore drew on methods for optimal route planning in general [4, 6, 9], as well as on problems from human medicine concerning the optimal routing of emergency vehicles [2, 7, 10].

3.3 Provide Detailed Information

Based on this information, we identified two additional applications. The first is to provide detailed information about nearby practices stored in the database. These details can be obtained by hovering over a practice marker, and include the name, address, phone number, website, and e-mail address, each presented as an interactive link for direct access. Future versions will additionally display specialization information (e.g., livestock, small animal, horses). This is illustrated in Fig. 3.

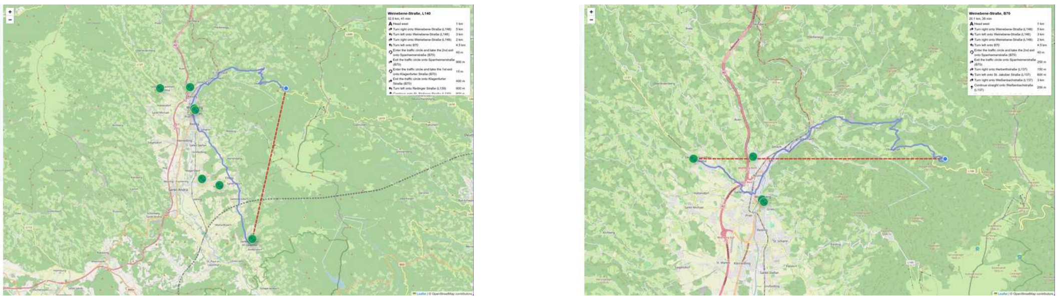


(a) Illustrative example 1. (b) Illustrative example 2.

Figure 3: Illustration of detailed practice information.

3.4 Get Direction

The second use case we identified is computing the direction (road distance) from the current position to a veterinary practice. By clicking the marker of the practice, the direction is computed and visualized on the map. In addition, a textual description of the direction is provided. In addition, we provide the possibility ot compare the road distance with the air distance, to make it apparent that the geographic distances might be highly different from the air distance. Two examples for this functionality are illustrated in Fig. 4.



(a) Illustrative example 1. (b) Illustrative example 2.

Figure 4: Illustration of found directios description of the pathway.

4 Conclusion and Future Work

Further work can be divided into three key aspects: (a) So far, optimal routes have been generated as in [6] using suitable speed-up techniques for Dijkstra's algorithm [5]. Further ideas from graph theory [1, 4] will be incorporated in the future. (b) Additionally, the rudimentary clustering approach will be supplemented with more suitable methods [11, 12, 13]. (c) So far, only geographic information has been used to compute the edge weights. In addition, topographic and traffic-related information, vacation periods, sick leave, or other availabilities of veterinarians can also be taken into account. Beyond these technical extensions, the database itself will be continuously expanded and refined: practices will be enriched with additional attributes such as veterinary specialization, opening hours, and real-time on-call availability, ensuring that the information remains current and practically useful. Furthermore, the web app will be extended to support mobile devices more fully, including push notifications for animal owners in urgent situations. Finally, a systematic evaluation of the service coverage across Austrian federal states is planned, with the goal of identifying underserved regions and informing policy decisions on the deployment of veterinary resources.

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