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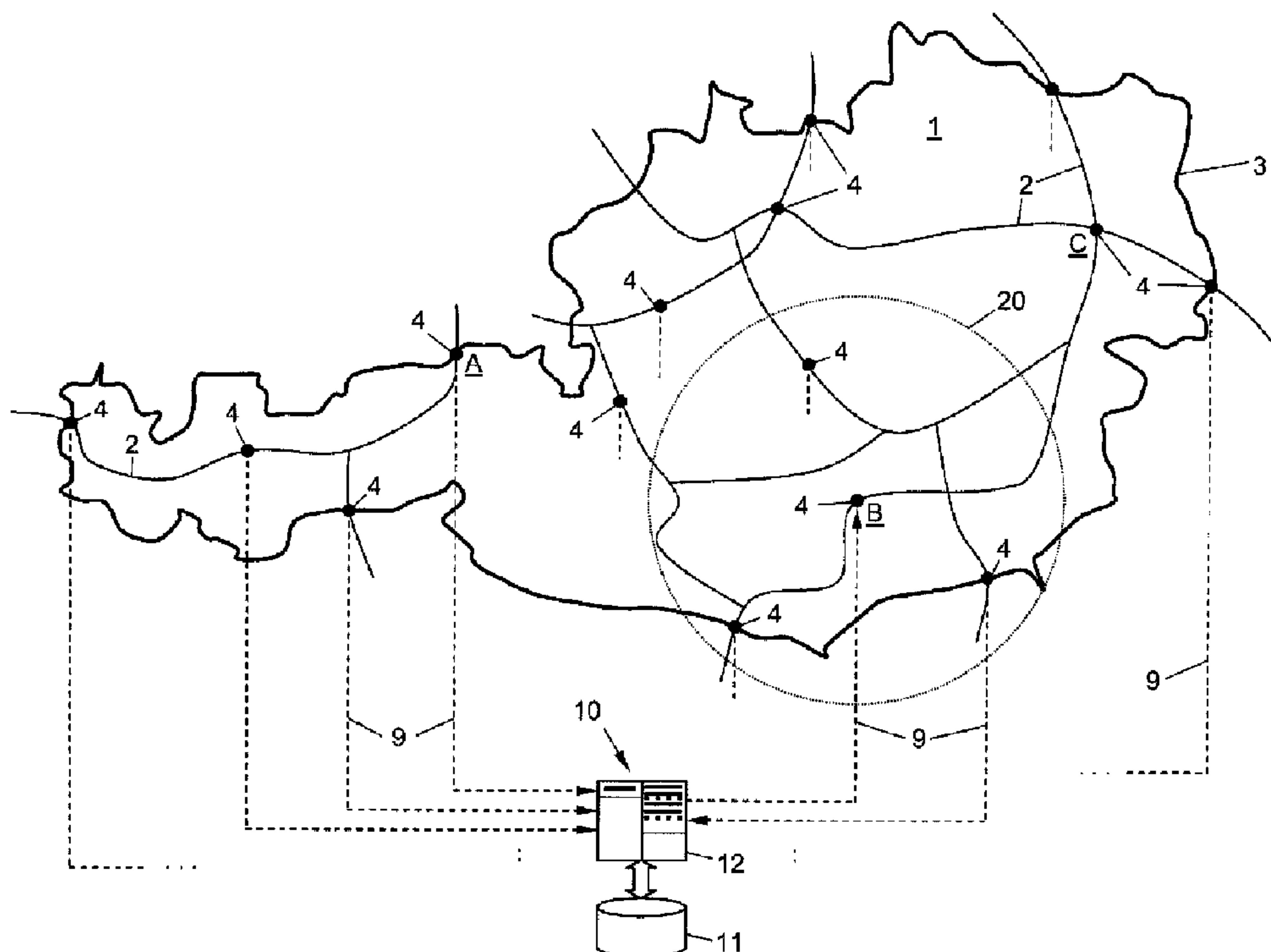
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(54) Titre : METHODE DE LECTURE D'IDENTIFICATIONS DE VEHICULE

(54) Title: METHOD FOR READING VEHICLE IDENTIFICATIONS



## Abstract

A method for reading license plate numbers, comprising: recording an image of a license plate number at a first location, OCR-reading a license plate character string in the image recording, and storing an OCR data; recording an image of a license plate number at a second location, OCR-reading a license plate number character string in the image recording, and generating a current OCR data set; and, if at least one confidence measure of the current OCR data set falls below a first minimum confidence value, selecting at least one stored OCR data set, the license plate number image recording of which OCR data set has a similarity that exceeds a minimum similarity value and/or has the greatest respective similarity to the license plate number image recording of the current OCR data set, and using the at least one selected OCR data set for improving the license plate number character string of the current OCR data set.

Method for Reading Vehicle Identifications

The invention relates to a method for reading license plate numbers by means of optical character recognition (OCR) in a road network.

Such methods are used, e.g., for video-based road toll systems or parking fee systems in order to identify vehicles based on their license plate number (LPN), and thereby to levy fees for vehicles using a location, to track them, or to impose fines for using a location. In image recordings of the license plates of passing vehicles, the license plate numbers are localized and converted by an OCR reading process into a character string of individual characters.

However, due to changing lighting conditions and changing visibility, e.g. due to snow, rain, shadowing effects or glares, and also due to soiling or disadvantageous mounting of the license plate, the error rate of OCR methods in practical operation is very high, in most cases 10 - 15%. This problem becomes even more serious due to the fact that the installation locations of the OCR reading stations are often predetermined by legal or technical framework conditions, e.g., at border stations or places where power and data connections are available, and therefore cannot be selected with regard to advantageous visibility, which further complicates capturing proper images of license plate numbers and thus makes the OCR process more difficult.

It is an object of the invention to overcome these disadvantages and to create an improved method for OCR reading license plate numbers.

This object is achieved with a method of the aforementioned kind, comprising:

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recording an image of a license plate number at a first location in the road network, OCR reading a license plate character string in the image recording, and storing an OCR data set including this license plate number image recording, this license plate number character string and at least one confidence measure of said OCR reading process in a database;

recording an image of a license plate number at a second location in the road network, OCR reading a license plate number character string in the image recording, and generating a current OCR data set including this license plate number image recording, this license plate number character string and at least one confidence measure of this OCR reading process;

and, if at least one confidence measure of the current OCR data set falls below a first minimum confidence value, selecting at least one stored OCR data set from the database, the license plate number image recording of which OCR data set has a similarity that exceeds a minimum similarity value and/or has the greatest respective similarity to the license plate number image recording of the current OCR data set, and using the at least one selected OCR data set for improving the license plate number character string of the current OCR data set.

In this manner, one or more earlier OCR-reading results of a license plate number are utilized for supporting or improving the current OCR reading result. By combined consideration or evaluation, the error rate thus can be significantly reduced. The invention is based here on the finding that in a temporally and/or spatially limited region of the road network with a plurality of geographically distributed OCR reading stations, there is a significant probability of OCR-reading the same license plate number twice or multiple times. Through this, the error potential in an OCR process can be reduced in that the current license plate number reading result is improved by

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selecting from earlier license plate number reading results or by superimposing earlier license plate reading results. Thus, additional OCR reading processes can also be performed at particularly "advantageous" locations, e.g., where vehicles move slowly or at a large distance between them, where all vehicles of a region have to pass, e.g., at border stations where good visibility prevails, e.g., on well-illuminated road sections, or where weather has no influence, e.g., in tunnels or the like. With all these measures, error potentials and therefore error rates of OCR reading processes at "disadvantageous" locations, which are required, e.g., due to legal and/or technical specifications, can be supported and improved.

Accordingly, a particularly preferred embodiment of the method is characterized in that based on a plurality of different first locations, a plurality of different OCR data sets are stored in the database. The more and better first OCR reading processes and therefore OCR data sets are generated at first locations, the better can be carried out the second OCR reading processes at the second locations.

A preferred use of the method according to the invention is that the license plate number character string of the current OCR data set is used for tolling a location usage of the vehicle in the road network, for example, calculating and levying a road toll for a toll road or a highway section, a regional toll for entering or staying in a region, e.g., a city toll, a parking or sojourn fee for the time of use of a location, e.g., a parking lot, or a fine for unauthorized use of a location, e.g., driving in a restricted area or the like. Generally speaking, location usage can be tolled (charged) time-related or location-related, or both. The use of the method according to the invention is possible in "open" as well as in "closed" toll road systems: In open toll road systems, a toll booth is arranged within a road

























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reading result, or can transmit the content of its data base to said other OCR reading station.

Accordingly, the invention is not limited to the illustrated embodiments, but comprises all variants and modifications which fall within the context of the attached claims.













