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論文の内容の要旨

The present research proposes a construction method of invention knowledge space using patent publications as a source for producing ideas and using patent knowledge for protecting an invention. It also examines whether the construction method is applicable to idea generations. As patent knowledge for constructing the invention knowledge space, there are patent generalization and a method for illustrating an invention construction with a circle. The patent knowledge is used to construct the invention knowledge space in a form of cylinder in a way which will be explained in detail. In the invention knowledge space, relevant knowledge will be organized and technological ideas will be produced.

An invention generation technique called as TRIZ and the equivalent transformation theory are known as technological idea generation methods for technological research and development. For example, TRIZ solves a technological problem to generate an invention. This invention generation technique has resulted from analyzing creation processes of many existing patented inventions, particularly, good ones to extract and organize technical problem solving methods. However, with the prior researches, an emphasis was placed on the solution of technical problems. First, a new technological problem is found and abstracted. Then, means or a method for solving the problem is devised based on a predetermined abstracted and organized problem solving method to solve the problem. The problem discovery step and the problem solution step are separated by the abstraction step, and thus, there is no direct and functional relationship between the problem discovery step and the solution step. Further, no prior researches are found to utilize the construction of an invention embodiment described in a patent publication as an idea generation source.

The research, at first, focuses its attention to the way of generating a new idea which is generated by functionally combining technological elements, and also to the construction of a new product or technology. Then, there are derived manners how technological developments are made and also the

structure of inventions which is multilayered from a patent system. And, there is used generalization as patent knowledge. Invention concept constructions are obtained respectively by generalizing a plurality of times the construction of an embodiment relating to an apparatus described in a patent publication, and are represented as corresponding circles. The circles are disposed on a straight line called as generalization axis. There will be produced an invention knowledge space in a form of a cylinder based on some of the circles. Generalizations are performed successively to organize relevant knowledge in the invention knowledge space. Technological ideas will be produced by utilizing or referring to the knowledge. The proposed method is in conformity with the invention protection method used in patent systems. Accordingly, it is expected to effectively utilize many patent publications which have been accumulated during a long time period in Japan.

There was conducted an idea production experiment in which patent professionals participated. The participants are used to patent generalization. With the experiment, a comparison was made between the ideas produced by the first group using the proposed method and the ideas produced by the second group not using the proposed method. The first group using the method obtained more distinctly favorable results in five evaluation items as practicality, feasibility, productivity, inclusiveness and insightfulness out of seven evaluation items except the number of ideas and originality. Further, in order to examine the effectiveness of the proposed method for the non-patent professionals, an experiment was conducted in which graduate students participated. The students had no experiences to conduct patent generalizations. A group using the proposed method obtained more distinctly favorable results in terms of practicality and feasibility out of seven evaluation items. Accordingly, results are obtained indicating that the proposed method is effective to patent professionals and non-patent professionals.

Further, in order to know indirectly a possibility how the proposed method will be accepted in the present society, investigations were made on patent data provided in Japan and the United States how patent generalizations were used for protecting inventions in the patent systems in the two countries respectively. Japanese patent applicants use the Japanese way of patent generalizations for 53% Japanese patent applications and for 74% U.S. patent applications filed. While, U.S. patent applicants use the U.S. way of patent generalizations for 54% U.S. patent applications and 74% Japanese patent applications. Thus, approximately 53% through 74% patent applicants in Japan and the United States use patent generalizations. The data indicate a good possibility that the proposed method is accepted in the Japanese and the U.S. patent systems respectively.

For future research work, it is planned that the proposed method will be disseminated and extended to general members of society as users thereof. There will be developed methods for learning and practicing generalizations for constructing an invention knowledge space so that users will be able to utilize the proposed method without any difficulty. Further, researches will be made to develop a technological idea generation support system connected to patent data bases, and to

combine the proposed method with other technological problem solving methods such as TRIZ.

論文審査の結果の要旨

本論文は、知的財産を記した特許文書を技術アイデア発想に活用するための手法を研究したものである。特許文書は権利範囲を明示化するため、技術発明が整理された形で記載されていることを期待できる。また、特許文書はデータベース化され、多くの人々が取得可能であり、その活用法が望まれてきた。従来からある特許に注目した技術アイデア発想法(例えば TRIZ)は特許にある発明内容を分析し、様々なアイデア思考法を提示しているが、特許システムと技術アイデアとの関係は利用していなかった。それに対して、本研究では、特許知識として権利保護のための上位概念化を技術発明の整理・概念獲得に用いており、この点が著者による着想・独創といえる。そして、提案した手法が技術アイデア発想を行うための手法として有用な知見を得ている。

研究では、特許文書を活用するための手法として発明保護を検討するために用いられる上位概念化を用いた発明知識空間構成法を提案している。この発明知識空間構成法では特許明細書に記載された特許請求の範囲と実施例等に基づき、上位概念化を複数回行う。この作業を通して、対象技術の発明構成を獲得・整理する。この発明知識空間構成法が技術アイデア発想に及ぼす影響を専門家の場合と非専門家の場合とに分けて実験を行い、提案手法を用いるとアイデアの実用性と柔軟性の項目がよくなるという知見を得ると共に、専門家の場合、アイデアの実現可能性、包括性と洞察性の項目も、加えてよくなるという知見を得ている。また、日本及び米国の特許システムにおいて発明の保護を受ける際に行われる特許の上位概念化の使用についても調べている。その結果、日本人の特許出願人は米国人の特許出願人と比べて発明実施例数が多い傾向があり、提案手法の上位概念化は米国人の上位概念化に近いという知見を得ている。

このように提案手法は特許文書を用いた技術アイデア発想に対する基本的効果や知見を示している。今後、提案手法における上位概念化の順番や上位概念化の停止を工夫することにより手法の改善が期待できる。また、提案手法は発散技法に分類される発想法の前処理技術としても活用でき、他の発想技法と組み合わせるといった研究の発展が期待できる。

以上、本論文は、知的財産である特許をアイデア発想に用いるための手法を考案し、その手法が持つ有用性を示したものであり、学術的に貢献するところが大きい。よって博士(知識科学)の学位論文として十分価値あるものと認めた。