Whole Genome Based Genetic Evaluation and Selection Process Patent Application

Introduction

The Whole Genome Based Genetic Evaluation and Selection Process patent application describes a method and system for the prediction of the merit of at least one individual in a population. In general, the method is comprised of the steps of: (a) in the population, where information of individuals are known, using dimension reduction on the information to project the information to a low dimensional space while retaining the complexity of the information to generate a set of explanatory variables; (b) utilizing the explanatory variables to generate a predictor function with respect to merit; and (c) utilizing the predictor function to predict the merit of the individual. In addition, it describes an information database product for use with breeding program comprising information of individuals of a population and prediction of the merit of the individuals in the population.

Claim Search Restriction

The first thing to note is that the International Search Report does not address all of the claims in the patent. The application was deemed to have three separate inventions that lacked any unity of invention among them. The three inventions were as follows:

1) Claims 1, 2, 13-61 and 65 when appended to the foregoing.

   Method comprising the steps of – in the population where information of individuals are known using the dimension reduction to project information to a low dimensional space, while retaining the complexity to generate set of explanatory variables, utilizing explanatory variables to generate predictor function and utilizing predictor function.

2) Claims 3-12 and claim 65 when appended to the foregoing.

   Method for the prediction of the merit of at least one individual in a population comprising the steps of – in the population where information of individuals are known using genetic algorithm process to generate set of explanatory variables, utilizing explanatory variables to generate predictor function and utilizing predictor function.

3) Claims 62-64 and claim 65 when appended to the foregoing.

   An information database product for use with breeding program comprising information of individuals of a population and prediction of the merit of the individuals in the population.

The Search Report states that "[t]he only feature common to all of the claims amounts to no more th[a]n a generic method in the population of individuals comprising explanatory variables and predictor function." It continues to state that this is not a novel concept in light of P. Filzmoser, C. Croux: "Dimension reduction of the explanatory variables in multiple linear regression", Pliska Stud. Math. Bulgar. 29 (2002), 1-12. Therefore, the application makes no contribution over the prior art and the common feature cannot constitute a special technical feature as required for unity of invention.

Because the Search Report found three separate inventions, the applicant was invited to pay additional fees to include more than one invention in the search. As of the printing of the Search Report, the applicant had not paid the additional fees. I cannot find any proof that they have paid since that time. The Search Report only addressed the first invention as found in Claims 1, 2, 13-61 and 65. The other two inventions were not examined.

Search Report Results

The Search Report focused on Claims 1, 13-57, 59-61 and 65 and found that those claims were not novel or considered to involve an inventive step in light of Filzmoser. No mention was made of Claims 2 and 58. Therefore, the applicant will have to show why the invention is different than Filzmoser. Once this difference is shown, the invention still must not be obvious when combined with any other references as well.

Claims 2 and 58, however, are not shown to be anticipated by Filzmoser. Claim 2 is a dependant claim that also includes the restrictions from Claim 1. Claims 1 and 2 are as follows:

> 1. A method for the prediction of the merit of at least one individual in a population, the method comprising the steps of:
>
> (a) in the population, where information of individuals are known, using dimension reduction on the information to project the information to a low dimensional space whilst retaining the complexity of the information to generate a set of explanatory variables;
>
> (b) utilizing the explanatory variables to generate a predictor function with respect to merit; and
>
> (c) utilizing the predictor function to predict the merit of the individual.
>
> 2. A method as claimed in claim 1 for a prediction of a merit of at least one individual, the method comprising the steps of:
>
> (a) in a first population, where genotype and phenotype information of individuals in the first population are known, using dimension reduction on the genotype and

phenotype information to determine the complexity of the genotype and phenotype information to minimize prediction error for at least one marker in the first population and thereby generate a set of explanatory variables with respect to the at least one marker;

(b) utilizing the explanatory variables to the first population to generate a predictor function with respect to merit;

(c) generating a genotype for the at least one marker in at least one individual of interest from a second population; and

(d) utilizing the predictor function to the genotype of the at least one individual of interest to determine the genetic merit of the individual of interest with respect to the at least one marker.

Claim 58 is as follows:

58. A breeders product comprising at least one gamete with a high prediction of merit for at least one marker, the breeders product selected by a method for the prediction of the merit of at least one individual, the method comprising the steps of:

(a) in a first population, where genotype and phenotype information of individuals in the first population are known, using dimension reduction on the genotype and phenotype information to determine the complexity of the genotype and phenotype information to minimize prediction error for at least one marker in the first population and thereby generate a set of explanatory variables with respect to the at least one marker;

(b) applying the explanatory variables to the first population to generate a predictor function;

(c) generating genotype for the at least one marker in at least one individual of interest from a second population;

(d) applying the predictor function to the genotype of the at least one individual of interest to determine the genetic merit of the individual of interest with respect to the at least one marker.

Without any guidance by the Search Report, the question of patentability will remain with the national patent authorities. There is no designation that the claims are allowable, but there is nothing noted against them. National patent authorities need not come to the same conclusion as the Search Report, but the Search Report is often very persuasive. Without a full review of Filzmoser, I cannot guess as to the likelihood of national patent authorities following the Search Report's conclusions.

Upcoming Events

The applicant demanded an international preliminary examination. The next step is to wait until that report is finished. That report may give additional information on Claims 2 and 58 and spell out the objections to the other claims in more detail. International preliminary examination is a second evaluation of the potential patentability of the invention, using the same standards on which the written opinion of the Search Report was based. If the applicant wishes to make amendments to their international application in order to overcome documents identified in the Search Report and conclusions made in the written opinion of the ISA, international preliminary examination provides the only possibility to actively participate in the examination process and potentially influence the findings of the examiner before entering the national phase. It provides the applicant with an even stronger basis on which to evaluate their chances of obtaining patents. At the end of the procedure, an international preliminary report on patentability will be issued.

After that it will be time for nationalization. Then, the applicant will have to decide which national patent authorities to which it would like to submit an application and which claims will be pursued. It would be surprising if the applicant chose to submit all the claims as is to each of the currently designated states given the negative conclusions of the Search Results. The international preliminary examination report should be considered by the Offices but is not binding on them.