GestaltMatcher research study and GestaltMatcher database.

Study information

Study information for adults, adolescents 14 years and older and legal representatives

Dear Patient, dear Sir or Madam,

Thank you for your interest in the GestaltMatcher Research Study and Database (GMDB)! Your participation in this study is voluntary. Before providing data/photos/further information, please make sure you have read the following study information and have given the necessary consent.

Study Information

You or your child (or the person in your care) have or are suspected of having a rare genetic disorder. The diagnostic process of such rare genetic disorders can be lengthy. Often, affected individuals and their families report complicated paths of diagnosis until a possible diagnosis is found. Our research study aims to shorten this diagnostic process.

In many genetic disorders, disease-specific features on the face give a hint of the underlying disease. A good example of this is Down syndrome. Many people immediately recognize an affected person by their face, because the patients share some special features. A specialized doctor can recognize many more and rarer diseases by specific facial features. However, a prerequisite for this is appropriate and sufficient experience with the individual clinical patterns. But it is precisely this experience that is often lacking in the case of rare diseases.

Figure 1: Facial similarities shown in the example of Down's syndrome; Source: royalty-free stock images from pixabay CCO)

Modern computer-aided image analysis methods can also learn to recognize such features in the face and thus reliably calculate similarities to individuals with an already confirmed diagnosis. In the PEDIA study, published in the renowned journal Genetics in Medicine in 2019, we were already able to show that the diagnosis rate is significantly increased by combining it with image analysis. Like a doctor, however, the computer system must first learn the characteristics of the diseases in order to recognize them. With the GestaltMatcher algorithm, published in 2022 in the high-impact journal Nature Genetics, we have developed an artificial intelligence (AI) that can not only recognize diseases it has already learned, but also diseases it is not previously trained to recognize. It also requires significantly fewer patient images than comparable systems to make the correct diagnosis. Such computational methods can provide medical professionals with a clue to a genetic disorder and assist in selecting a particular molecular test. In addition, AI can also be used to interpret the results of molecular genetic testing.

Our research study will investigate and improve the quality of currently available image analysis methods (e.g., GestaltMatcher). We will also investigate whether a new mutation assessment protocol called PEDIA (prioritization of exome data by image analysis) improves diagnostic yield.

Study procedure and data collection

The performance of the GestaltMatcher AI depends largely on the dataset with which it has been trained. For this purpose, we created the GestaltMatcher database.

As part of routine diagnostics, the clinical characteristics of patients are documented using photographs and medical genetic terminology. Within the scope of the study, only data from this routine diagnostic procedure will be collected and analyzed. These data are the clinical features or symptoms, the medical photographs and the test results from the laboratory. Usually, these data have already been collected by your attending physician and will be transmitted to us by you or your physician and stored pseudonymously in the GestaltMatcher database. Thus, the collected data is compiled, can be used for the training of the AI and is made searchable for medical professionals. It is also possible for medical professionals to use the GestaltMatcher AI within the database and thus determine similarities between individuals in the database. This database is under strict access control and is and will continue to be accessible only to a select scientific audience for the purpose of improving the diagnosis of rare diseases.

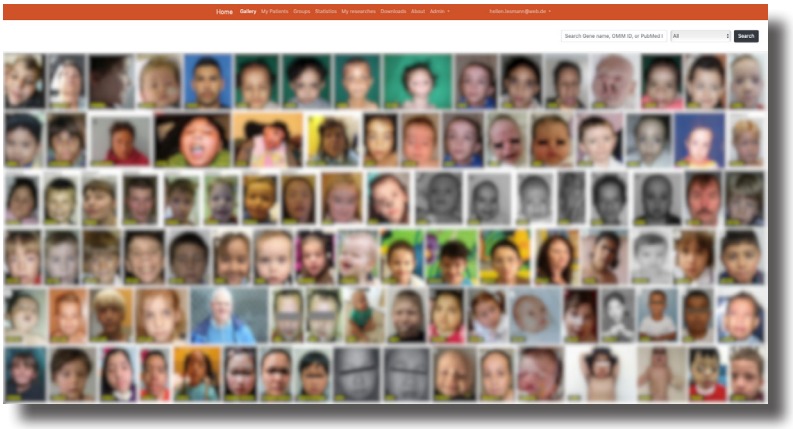
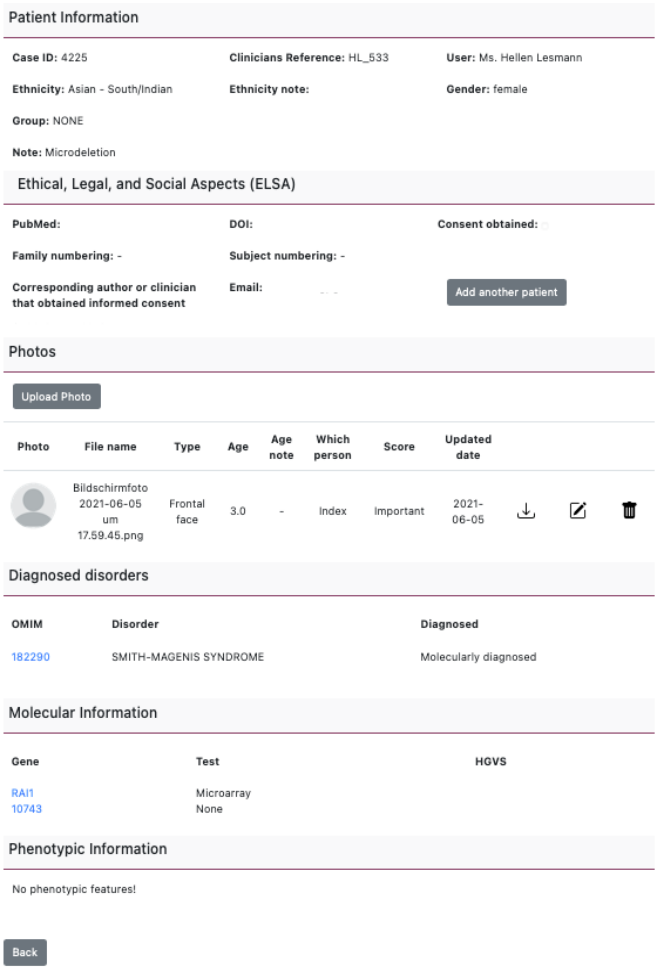


Figure 2: Gallery view
Doctors can use the gallery to search for images of specific diseases or disease-causing genes. This way, they can see many portrait images of a syndrome at a glance, compare them with their patients and gain experience. In the future, they may then be able to recognize rare diseases more quickly on the basis of particular facial features.

Figure 3: Representation of individual participants in the database.
You can see how the data is represented in this figure. The following are stored: gender, ethnicity, the disease, the causative disease gene, and other phenotype information, if applicable. The uploaded photo will be displayed in the „Photos“ section and in the gallery.



You can decide for yourself how your data can be used in the GestaltMatcher database as part of the consent form:

It is possible to consent only to the storage of images in the database. The images will not be visible to other users in the database, but can be used for artificial intelligence training purposes. The stored data is only visible to the uploading physician. For direct similarity comparisons with other affected persons, however, the images are thus only available to your attending physician.

In addition, you can optionally decide on the following points:
You can decide whether the images should be visible in the GMDB. This makes the images searchable by researchers in a protected environment and can be used to make similarity comparisons with other patients. This comparison can potentially serve as an important clue for patients who do not yet have a diagnosis. The data will not be published along with personally identifiable information. However, since the images are visible to researchers with access to the database, someone may recognize you from the image.
You can also indicate whether your data may be used for teaching purposes to students and residents, or whether you would consent to publication in journals. Alternatively, you may leave this item unanswered at this time and decide if publication is a consideration. In this case, we would contact you again.

The database is funded by the non-profit organization Arbeitsgemeinschaft Gen-Diagnostik (AGD) e.V. The Institute for Genomic Statistics and Bioinformatics (IGSB) at the University of Bonn is responsible for conducting and managing the study and for the scientific analysis of the data. In addition, there are other centers throughout Germany that are enrolling patients in the study to accompany the national GenomDE project and also international projects.
Participation in this study is voluntary. You will only be included if you give your written consent. If you do not wish to participate in the study or wish to withdraw from it at a later date, this will not result in any disadvantages for you. You can withdraw your consent verbally or in writing at any time, even without giving reasons.

Possible risks

Since our study only requires data that is already collected in standard care, there are no medical risks associated with participation and no additional examinations are required. Your participation in the study will not affect your medical treatment, about which you have already been informed by your treating physician.

Possible benefits from your participation in the study

If you (or your child or the person you are caring for) do not yet have a diagnosis, using AI may help speed up the process of finding a diagnosis.
If you already have a known diagnosis, your participation in this study will not benefit your health. However, the results of this study may help improve the care of other patients who have your condition.

Data protection

The legal basis for data processing is your voluntary consent (Article 6(1)(a) DSGVO and Article 9(2)(a) DSGVO).

Responsible for data processing:
Institute for Genomic Statistics and Bioinformatics
University Hospital Bonn - Institution under public law
Venusberg Campus 1
Building 11
53127 Bonn

The data will be kept confidential at all times. The data will be uploaded to the GestaltMatcher database under a pseudonym by the supervising physician or by yourself. Pseudonymization means that the personal data such as the name and date of birth can no longer be assigned to a specific person without the use of a list. The personal data is replaced by a number and/or letter code; the date of birth is limited to age. Decoding will only take place if we contact you again for further research projects and you have agreed to this beforehand. Only the responsible persons in the respective study center have access to the personal data.

The data will initially be stored for 20 years. Given the far-reaching goals of the study, it is possible that even after the 20 years have elapsed, not all of the scientific questions of the study have been fully answered and that storage for the training and benefit of the AI continues to appear useful. In this case, the research project would be resubmitted to the relevant ethics committee before the 20 years expire. The ethics committee would then decide on the continued storage of the data.

Are there risks associated with data processing?

There are confidentiality risks associated with any collection, storage, use and transmission of data (e.g., the possibility of identifying the person concerned). These risks cannot be completely eliminated and increase the more data can be linked together. The initiator of the study assures you that it will do everything possible according to the state of the art to protect your privacy and will only pass on data to bodies that can demonstrate a suitable data protection concept. There are no medical risks associated with data processing.

Disclosure and publication of data

If you consent to the publication of the data in the GMDB, they may also be shared pseudonymously by scientists from countries outside the EU internal area, e.g. the USA to use the data for machine learning as well. These countries may have a lower level of data protection. With your consent to publication, you agree that the data may also be transferred to these countries. However, for this, a request must first be made by the scientist and a privacy statement must be signed so that an adequate level of data protection exists at all times.

The genetic data obtained can be integrated into international databases in which data sets from different countries are analyzed together. The dissemination of the data, including the publication of the resulting findings in scientific journals, will only take place in pseudonymized form - i.e. without names or personal data identifying you. The data will only be used in scientific studies that have been approved by an ethics committee.
The data will primarily be forwarded if they are stored in the target country on servers with security and data protection standards similar to those in Europe (cf. Art. 45 DSGVO). In exceptional cases, data may also be transferred to cooperation partners in countries where there is no comparable level of protection, but in this case the previously mentioned conditions apply without restriction.
If research results are contributed to international databases in pseudonymized form, access to these databases is restricted and precisely regulated, i.e. the data are only made available to selected scientists upon request. Data sharing is strictly controlled by special committees.
We intend to publish the results of this research project in scientific journals and at conferences. These publications will not contain any personally identifiable information. However, because they are photographs of the face, there is a possibility that someone may recognize you or your child/the person in your care. As part of the consent form, you can specify whether you agree to access-controlled publication in GMDB, or whether you also agree to publication in journals and at conferences.

What other rights do I have with regard to data protection?

You have the right to receive information about your stored personal data. In addition, you can request the correction of inaccurate data, the deletion or the restriction of the processing of your data.

Contact details of the data protection officer:

Achim Flender
University Hospital Bonn
Venusberg Campus 1
53127 Bonn
E-mail: datenschutz@ukbonn.de
Telephone: 0049228 - 287 160 75

Right of complaint to the supervisory authority:

You have the right to contact the competent supervisory authority at any time:
North Rhine-Westphalia State Commissioner for Data Protection and Freedom of Information.
Kavalleriestr. 2-4, 40213 Düsseldorf, e-mail: poststelle@ldi.nrw.de, phone: 0211 - 384 24-0.

Can I revoke my consent?

You can revoke your consent at any time without incurring any disadvantages. The revocation of consent does not affect the lawfulness of the processing carried out on the basis of the consent until the revocation.
For this purpose, please contact the person responsible for the project:


Peter Krawitz, MD/PhD

Prof. Dr. med. Peter Krawitz

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Chairman of the Arbeitsgemeinschaft für Gen-Diagnostik e.V. (AGD)
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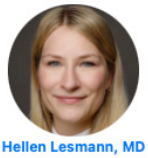
Do you have questions, feedback or suggestions?

Please contact us:

info@gestaltmatcher.org


Tzung-Chien Hsieh


Tom Kamphans, PhD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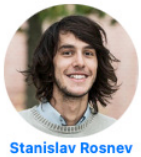
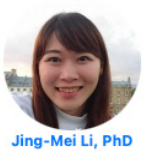

Stanislav Rosnev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