



Pioneering Purity: AI-Driven Impurity Detection in Bird's Nests

纯净先锋 之 AI 驱动燕窝杂质检测系统

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Project Introduction

项目简介

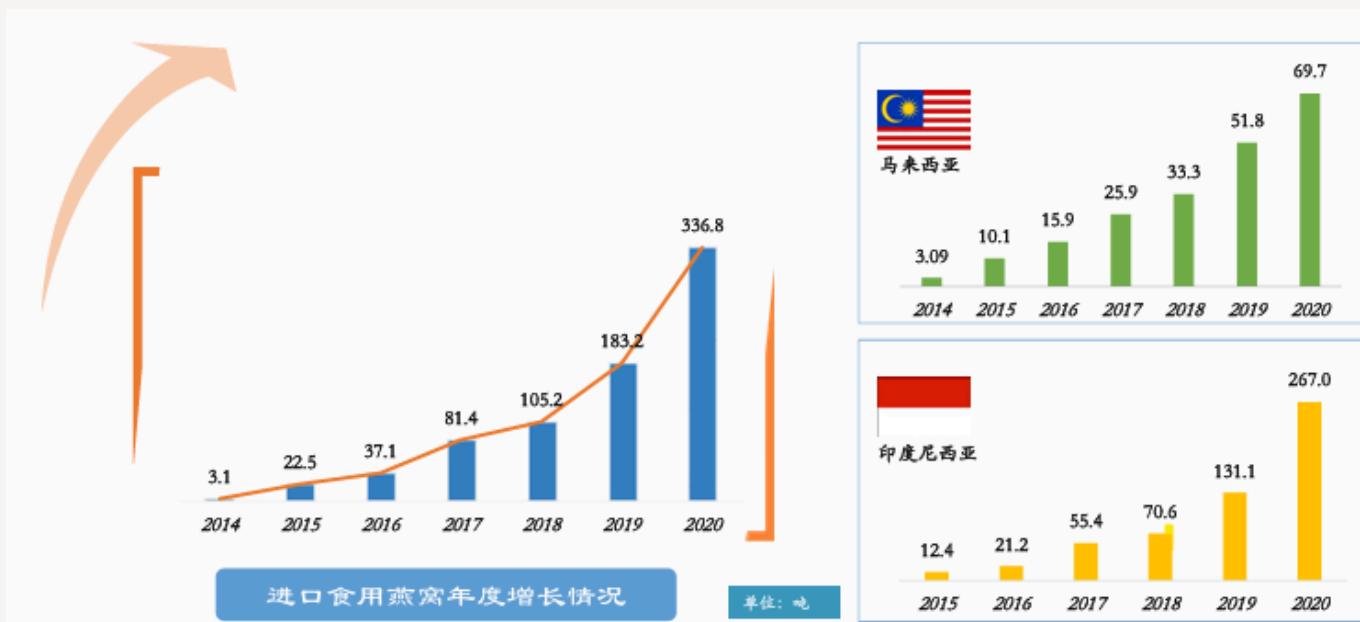
The edible bird's nest industry in Southeast Asia is vital economically but struggles with impurities affecting product quality. A proposed solution involves using AI and image processing to detect impurities, aiming to improve quality control, increase consumer trust, and advance the industry economically and sustainably.

燕窝产业在许多东南亚国家是主要收入来源，因为它生产出珍贵美味的佳肴和传统保健产品。然而，由于羽毛和碎屑等杂质，维持产品纯度和质量是一大挑战。传统人工检查程序受劳动密集和易出错影响，难以保证有效性和可靠性。提出的创新策略是建立使用图像处理识别燕窝杂质的人工智能系统（AI）。旨在通过先进技术彻底改善品质控制程序，确保更高产品标准和客户信心，这个项目不仅解决了当前行业难题，也促进了燕窝行业的可持续增长、扩大了市场份额、提高了经济效益。



Bird Nest's Report

近年燕窝报告



(中国检验检疫科学研究院, 2021)

The annual report above shows the Chinese people's consumption of imported bird's nests (2014 - 2020). From the report, it can be seen that the annual import of edible bird's nests has a gradual growth trend, and the report of Malaysia and Indonesia transporting imported edible bird's nests to China is also increasing annually. This is a trend of economic growth for all three countries.

以上图片显示 中国人民食用进口燕窝的年度报表(2014 - 2020)，从报表上来看 每年进口食用燕窝有渐渐增长的趋势，而且马来西亚和印度尼西亚运输进口食用燕窝到达中国的报表也在年度增长。这对三个国家都有经济增长的趋势。

| 马来西亚燕窝加工企业 | | | | | |
|------------|------------------------------------|--------|----|---|--------|
| 序号 | 企业名称 | 注册号 | 序号 | 企业名称 | 注册号 |
| 1 | SUNSHINE REGION SDN.BHD. | A3A002 | 18 | BLUE SKY BIRD NEST SDN BHD | D8A001 |
| 2 | PT SWIFT MARKETING SDN.BHD. | A0A002 | 19 | RICKSEN(M) SDN BHD | 11A003 |
| 3 | TIAN MA BIRD NEST SDN.BHD. | 27A001 | 20 | GENIUS REVOLUTION SDN. BHD. | A3A004 |
| 4 | KUAN WELLNESS SDN.BHD. | A4A001 | 21 | MEI WEN BIRDNEST TRADING SDN. BHD. | A0A004 |
| 5 | FUCIPHAGUS AGRITECH SDN.BHD. | 72A002 | 22 | MOH KEE ENTERPRISE SDN. BHD. | 89A001 |
| 6 | YANMING RESOURCES SDN.BHD. | A0A003 | 23 | GLITTER SUMMER SDN. BHD. | 71A001 |
| 7 | GOLDEN-MAH BIRDNEST SDN.BHD. | A3A001 | 24 | KOPERASI PENTERNAK BURUNG WALIT MALAYSIA BERHAD | 28A001 |
| 8 | YEN PAO LAI (M) SDN BHD | 60A001 | 25 | GLORY-WORKS SDN. BHD. | D6A007 |
| 9 | WING SHEN FOOD INDUSTRIES SDN BHD | D1A001 | 26 | ZHENG FENG EQUITY SDN. BHD. | 14A003 |
| 10 | DYNAMIC TRANSFORMS SDN BHD | A3A003 | 27 | AMITY AKF ENTERPRISE SDN. BHD. | 11A002 |
| 11 | PUTRA SIALIN BIOTECHNOLOGY SDN BHD | 14A001 | 28 | WANSERN AGROTECH SDN. BHD. | 12A005 |
| 12 | NEST WORLD SDN BHD | 17A001 | 29 | MING FENG MARKETING (M) SDN. BHD. | A1A009 |
| 13 | DAMA DINGJI YANWO SDN BHD | 18A001 | 30 | YAN OU HOLDINGS (M) SDN. BHD. | A2A003 |
| 14 | STEADY FARM SDN BHD | A6A001 | 31 | DRAGON BRAND BIRDNEST SDN.BHD. | D1A021 |
| 15 | SWALLOWS HOUSE ENTERPRISE | D1A002 | 32 | MULTIFORM FOOD SUPPLY CO. SDN BHD | 41A001 |
| 16 | KA SIN SUCCESS(M) SDN BHD | 41A033 | 33 | SWIFTLET FORTUNE MANUFACTURING SDN. BHD. | A0A005 |
| 17 | BORNEO YIN WOH SDN BHD | C2A002 | 34 | MBN ENTERPRISE SDN.BHD. | 41F011 |

(中国检验检疫科学研究院,2021)

Malaysian bird's nest processing companies cleaning the bird's nests to meet clean and healthy standards.

马来西亚燕窝加工企业去清理燕窝以达到干净健康的标准。

印度尼西亚生产企业输华食用燕窝量排行榜

| 排名 | 企业名称 | 注册号 |
|----|-----------------------------------|-----|
| 1 | PT.ORI GINALNEST INDONESIA | 014 |
| 2 | PT ANUGERAH CITRA WALET INDONESIA | 027 |
| 3 | PT. ORGANIC HANS JAYA | 025 |
| 4 | PT.ESTA INDONESIA | 002 |
| 5 | PT.ASIA PRATAMA WALINDO | 011 |
| 6 | PT. TONG HENG INVESMENT INDONESIA | 018 |
| 7 | PT.BUANA MULIA INDONESIA | 009 |
| 8 | CV.SUMBER ALAM | 004 |
| 9 | PT.FORTUNE NESTINDO SUKSES | 029 |
| 10 | PT. ADIPURNA MRANATA JAYA | 001 |

马来西亚生产企业输华食用燕窝量排行榜

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|----|-----------------------------------|--------|
| 1 | PT SWIFT MARKETING SDN. BHD. | A0A002 |
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| 5 | RICKSEN(M) SDN BHD | 11A003 |
| 6 | MING FENG MARKETING (M) SDN. BHD. | A1A009 |
| 7 | YEN PAO LAI (M) SDN. BHD. | 60A001 |
| 8 | YANMING RESOURCES SDN. BHD. | A0A003 |
| 9 | NEST WORLD SDN. BHD. | 17A001 |
| 10 | TIAN MA BIRD NEST SDN. BHD. | 27A001 |

[\(中国检验检疫科学研究院,2021\)](#)

Ranking of companies that producing bird's nests in Indonesia and Malaysia that export edible bird's nests to China.

印度尼西亚和马来西亚生产燕窝的企业运输进口食用燕窝到达中国企业的排名。

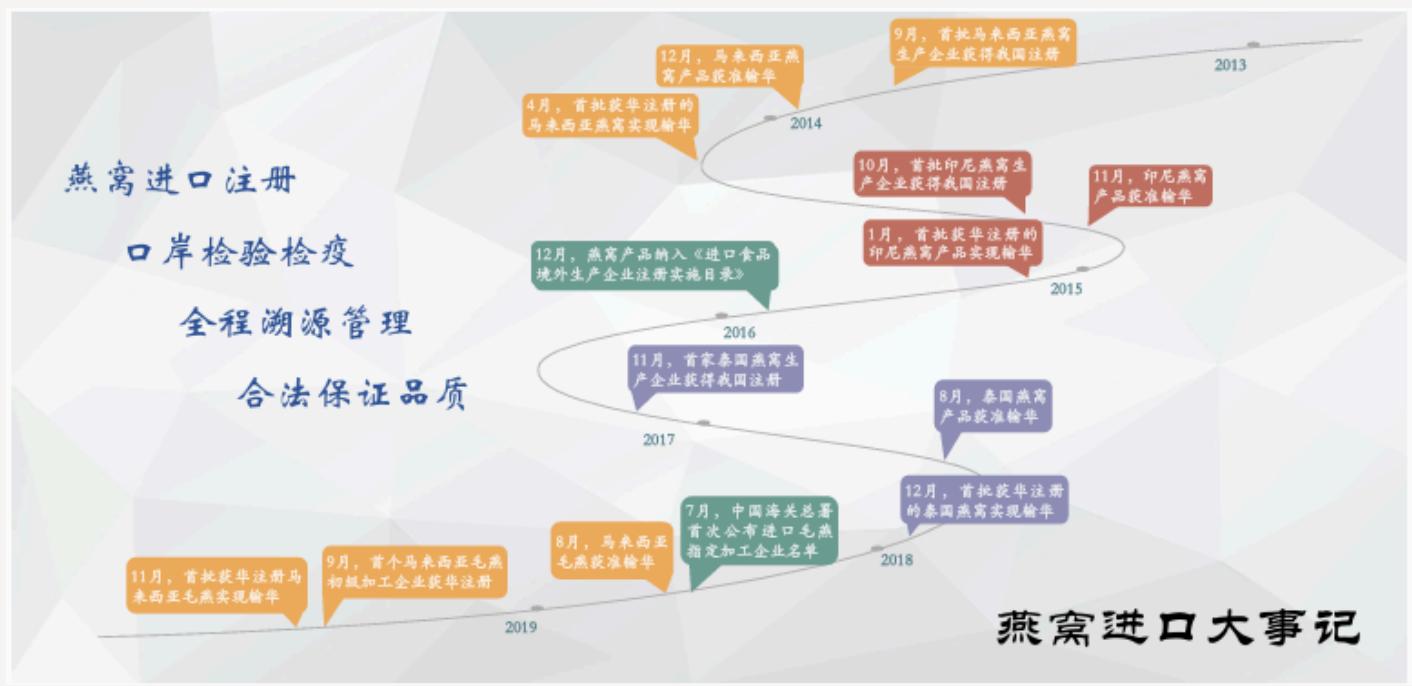
进口商排行榜（按照食用燕窝进口量排名）

| 排名 | 企业名称 | 排名 | 企业名称 |
|----|-----------------|----|------------------|
| 1 | 厦门市燕之屋丝浓食品有限公司 | 11 | 泉州国燕贸易有限公司 |
| 2 | 上海众燕进出口贸易有限公司 | 12 | 深圳市天勤投资发展有限公司 |
| 3 | 广州市天健贸易有限公司 | 13 | 青岛海宇嘉国际贸易有限公司 |
| 4 | 广州市淘陶贸易有限公司 | 14 | 燕之初健康美（厦门）食品有限公司 |
| 5 | 广州市牧人燕贸易有限公司 | 15 | 广东泰升药业有限公司 |
| 6 | 广州正基药业有限公司 | 16 | 广州龙标心燕食品有限公司 |
| 7 | 北京同仁堂健康药业股份有限公司 | 17 | 大洲新燕（厦门）生物科技有限公司 |
| 8 | 广东盛兴隆药业有限公司 | 18 | 福建省知云进出口贸易有限公司 |
| 9 | 厦门燕姆进出口有限公司 | 19 | 广东三宝明成国际贸易有限公司 |
| 10 | 青岛正典生物科技有限公司 | 20 | 广州市国鼎贸易有限公司 |

[\(中国检验检疫科学研究院,2021\)](#)

Ranking of China's companies that import edible bird nest from other countries

中国进口燕窝企业排名



(中国检验检疫科学研究院,2021)

Currently, the bird's nest exporting countries that have gained access to China include Malaysia, Indonesia, and Thailand. There are a total of 60 bird's nest production companies registered with the General Administration of Customs of China, including :

- 35** Malaysian production companies (33 edible bird's nest production companies, 1 bird's nest beverage production company, 1 raw bird's nest primary production company)
- 23** Indonesian production companies (edible bird's nest processing companies)
- 2** Thailand production companies (edible bird's nest processing companies)

In summary, the cooperation between China, Indonesia and Malaysia is very pleasant. China can import bird's nests that meet the standards for cleanliness and health for consumption, while Indonesia and Malaysia can import bird's nests to China to achieve economic growth. This is a win-win situation.

目前，获得中国准入的燕窝出口国包括马来西亚、印度尼西亚、泰国三个国家，获得中国海关总署注册的燕窝生产企业共60家，包括：

- 35** 家马来西亚生产企业 (33家食用燕窝生产企业, 1家燕窝饮品生产企业, 1家毛燕初级生产企业)
- 23** 家印度尼西亚生产企业 (食用燕窝加工企业)
- 2** 家泰国生产企业 (食用燕窝加工企业)

综上所述，中国与印度尼西亚和马来西亚的合作非常愉快，中国可以进口达到标准清洁跟健康的燕窝食用，而印度尼西亚与马来西亚可以进口燕窝到达中国以达到经济增长，这是一个三赢的局面。

Classification of Bird Nest

燕窝的品种介绍

Bird's nest is a precious medicinal material and tonic. A bird's nest is a nest that a male swiftlet builds for his wife to lay eggs.

Swiftlets have a unique salivary gland in their throat. It uses saliva mixed with other things, such as feathers, weeds, etc., to create their nests. After cleaned and remove impurities, it becomes a treasure on people's dining tables

燕窝是一种名贵的药材和滋补品。燕窝是雄性金丝燕为它的妻子建造的用于产卵的巢穴。

金丝燕的咽喉部位有一个奇特的唾液腺，金丝燕用唾液混杂着其它东西，例如羽毛、杂草等，制造出它们的燕巢。经过人们的清洗除杂后，成为人们餐桌上的珍品

血燕 Swiftlet's Nest



- 血燕的血色绝不是来自于金丝燕的血液。
- 红色燕窝的颜色是由于其唾液中含有的矿物质比较多，亦或者是金丝燕将巢穴建在了岩壁之上，其中矿物质与空气中的水，氧气反应，呈现出血色的效果。
- 物以稀为贵，血燕产量稀少，价格也很高。



白燕 Edible Bird's Nest

- 市面上见到的燕窝大多是白燕。



黄燕 Yellow Bird's Nest

- 金丝燕的唾液含有较多胶质后被空气氧化变成黄色。

Shape 形状

Cup

- The most complete bird's nest.
- The price is also the highest among the same type of bird's nest. It is usually boat-shaped, cup-shaped or triangular-shaped, large and full. Because the bird's nests are all produced by wild swiftlets, each bird's nest looks different.

Strips

- Strips are bird's nests that are processed into larger pieces after the shape of the bird's nest is accidentally damaged during the picking or processing.
- It is comparable to Cup, both of which are rich in protein nutrients. In terms of price, Strips will be greatly discounted. If your budget is limited, you can consider buying Strips.

Corner

- The head and tail of the bird's nest are bonded to the attachment. Generally speaking, the bird's nest corners are purer and tighter, because the swiftlet adds more of its own saliva to ensure the stability of the nest when building the nest.
- Because the bird's nest corners are in close contact with the attachments, it is more likely to be infiltrated, and the bird's nest corners are generally darker in color.

燕盏

- 最完整的燕窝。
- 价格也是同类型燕窝中价格最高的。它通常呈船状，杯状或者是三角状，又大又饱满。因为燕盏都是野生金丝燕产出，所以每个燕窝长得都不一样。

燕条

- 燕条是在摘取燕窝或加工处理时不慎损伤了燕窝的形态，后加工成较大碎片的燕窝。
- 它与燕盏不分伯仲，都是富含蛋白质营养品。在价格上，燕条将大打折扣。如果您的预算有限，可以考虑入手燕条。

燕角

- 燕窝与附着物粘结在一起的头部和尾部，一般而言，燕角会更加纯净，紧致，因为金丝燕在筑巢时，要多添加自己的唾液来确保巢穴的稳固。
- 由于燕角与附着物紧密接触，所以它被渗色的几率更大，一般燕角颜色更深。

Use of Bird's Nest 燕窝的功效

Excellent beauty ability

- Bird's nest contains a lot of protein and growth factors. This growth factor promotes skin regeneration and repair, and protein is an important source of skin elasticity. It can help users get skin nourishment.

Ability to strengthen the body

- It also contains minerals, water-soluble proteins, and various types of amino acids. It can regulate qi and blood, strengthen the liver and kidneys, protect the heart, and improve the body's immunity.

Brain-boosting abilities

- The bioactive ingredients and bird's nest acid in bird's nest can help children enhance their memory and make their thinking more agile.

卓越的美颜能力

- 燕窝中含有许多蛋白质和生长因子。这种生长因子可以促进皮肤再生和修复，蛋白质是保持肌肤弹性的重要来源。它就能帮助食用者获得肌肤的滋养。

强身健体的能力

- 它还含有矿物质和水溶性蛋白质，多种类的氨基酸。可以调气血，壮肝肾，养护心脏，提高身体免疫力。

益脑的能力

- 燕窝中生物活性成分和燕窝酸可以帮助小孩子增强记忆力，让孩子的思维更加敏捷。

Problem Statement

问题总汇

Silky edible bird's nests are highly valued for their medicinal and culinary benefits but face significant challenges during harvesting and purification. Contamination from debris like feathers and twigs diminishes edible yield, while manual sorting introduces inconsistencies and risks damaging the nests. To address these issues and ensure consistent quality that meets industry standards, there is a pressing need for automated technologies. Integrating image processing and AI offers a promising solution to optimize the purification process. This innovative approach not only enhances efficiency and scalability but also improves hygiene and product safety, thereby safeguarding the integrity of this prized nutraceutical.

丝绸燕窝因其药用和烹饪益处而备受重视，但在采摘和净化过程中面临重大挑战。来自羽毛和树枝等杂质的污染会降低可食部分产量，而手工分类则可能引入不一致性，并增加损坏燕窝的风险。为了解决这些问题并确保达到行业标准的一致质量，迫切需要自动化技术。结合图像处理和人工智能提供了一个有前景的解决方案来优化净化过程。这种创新方法不仅提升了效率和可扩展性，还改善了卫生和产品安全性，从而保障了这种珍贵保健品的完整性。

Cleanup Process

清理过程



The traditional method of cleaning bird's nest is time-consuming and not efficient.

传统手法清理燕窝即费时又费力。



Proposed Solution

提成方案

The proposed study aims to develop an automated system integrating artificial intelligence (AI) and advanced image processing techniques for the cleaning of silky edible bird nests. It begins with obtaining high-quality nest images and enhancing them through preprocessing steps like noise reduction and contrast improvement. Subsequently, features such as shape, texture, and color are extracted using methods like edge detection and color segmentation. AI models, including support vector machines and convolutional neural networks, are then trained to identify and categorize various types of impurities based on these extracted features. Finally, purification algorithms such as image segmentation and object removal will be implemented to effectively eliminate contaminants, ensuring enhanced efficiency and consistency in the purification process.

此研究旨在开发一个集成人工智能（AI）和先进图像处理技术的自动化系统，用于清洁丝绸燕窝。

(1) 研究从获取高质量的燕窝图像开始，并通过降噪和增强对比度等预处理步骤来改善图像质量。

(2) 通过边缘检测和颜色分割等方法提取形状、纹理和颜色等特征。利用支持向量机和卷积神经网络等AI模型进行训练，基于这些提取的特征识别和分类各种类型的杂质。

(3) 实施图像分割和物体移除等净化算法，有效清除污染物，确保净化过程的提升效率和一致性。



Mission & Vision

使命与愿景

Mission

Our mission is to revolutionize the bird's nest market by creating and deploying cutting-edge artificial intelligence (AI) technology that uses image processing to identify impurities. In addition, we will ensure the highest standards of product quality and safety through innovation and technology, enhance consumer confidence and promote industry growth.

我们的使命是通过创造和部署使用图像处理识别杂质的尖端人工智能（AI）技术来彻底改变燕窝市场。除此之外，我们也将通过创新和技术去保证最高标准的产品质量和安全，增强消费者信心并促进行业增长。

Vision

Our vision is to be the leading provider of AI-driven solutions for the edible bird's nest industry, fostering a future where technology seamlessly integrates with traditional practices to deliver superior quality products. We aspire to create a sustainable and economically thriving industry that sets new benchmarks for purity, efficiency, and global market reach.

我们的愿景是成为燕窝行业领先的人工智能解决方案提供商，创造一个技术与传统做法无缝结合的未来，以提供优质的产品。我们渴望创造一个可持续发展且经济繁荣的行业，为纯度、效率和全球市场覆盖率树立新的标杆。

Target Market

目标市场

The target market for the analysis includes manufacturers, producers, quality control laboratories, and testing facilities involved in the production and assessment of silky edible bird's nests stand to gain significant advantages from the study's findings. They can utilize insights to develop and deploy automated purification systems that enhance product quality and consistency, meeting stringent industry standards and satisfying customer demands. By integrating suggested methods and algorithms into their quality evaluation processes, these stakeholders can improve the accuracy of impurity detection and elimination, thereby ensuring higher overall product integrity and reliability.

该分析的目标市场包括参与丝绸燕窝生产和评估的制造商、生产者、质量控制实验室和测试设施。这些利益相关者有望从研究成果中获得显著优势。他们可以利用研究洞察力来开发和部署自动化净化系统，提升产品质量和一致性，达到严格行业标准并满足客户需求。通过将建议的方法和算法整合到质量评估过程中，这些利益相关者可以提高杂质检测和清除的准确性，从而确保产品的整体完整性和可靠性更高。



Manufacturers



Producers



Quality Control Laboratories



Testing Facilities

Competition / Contribution

竞争/贡献



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Project Timeline

项目里程碑



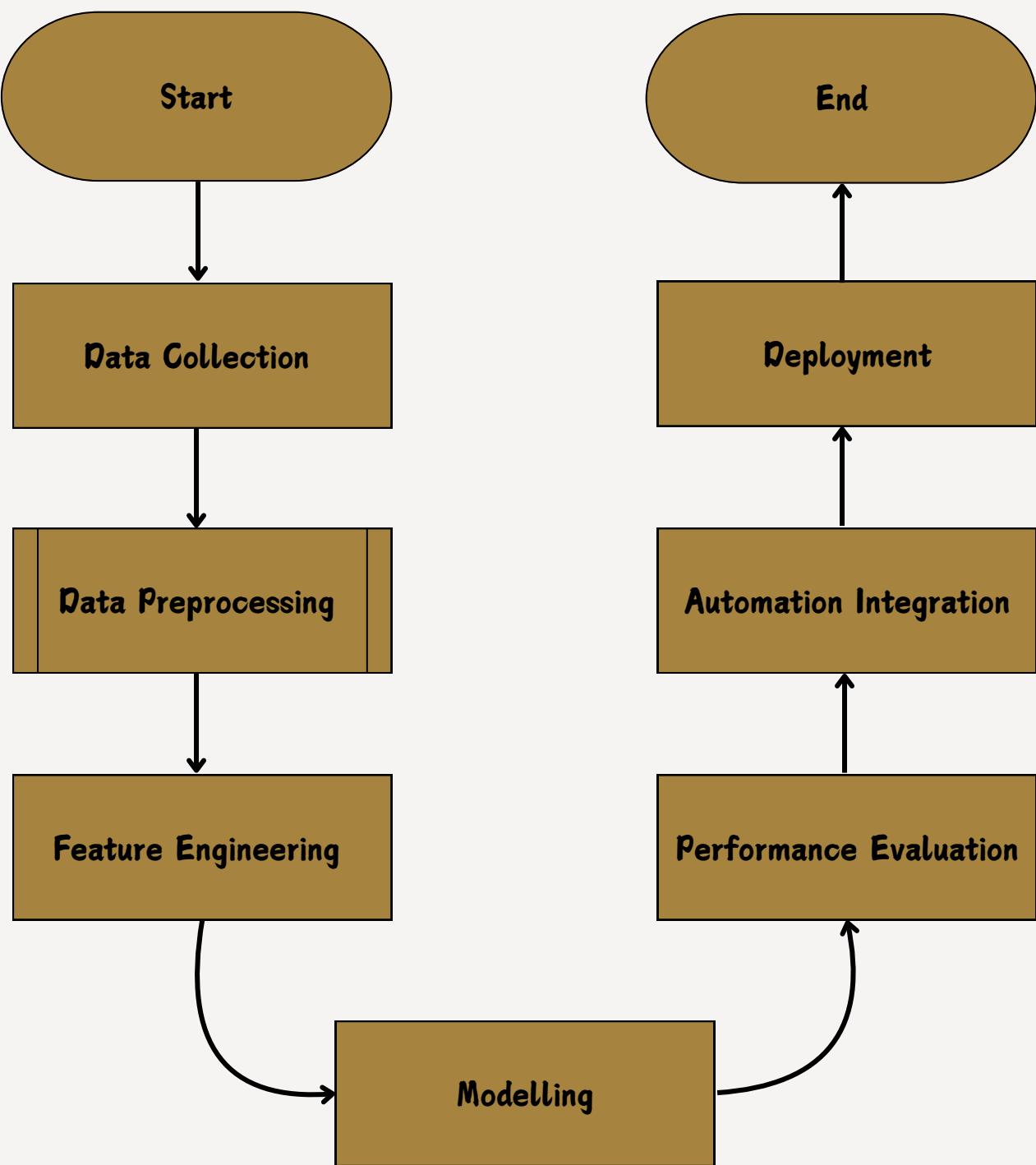
This project's purpose is to research impurity detection, classification the Silky Edible Bird's Nest then labeling it out and purification process.

这个项目的目的是研究燕窝杂质检测和分类，然后进行标注和净化过程。



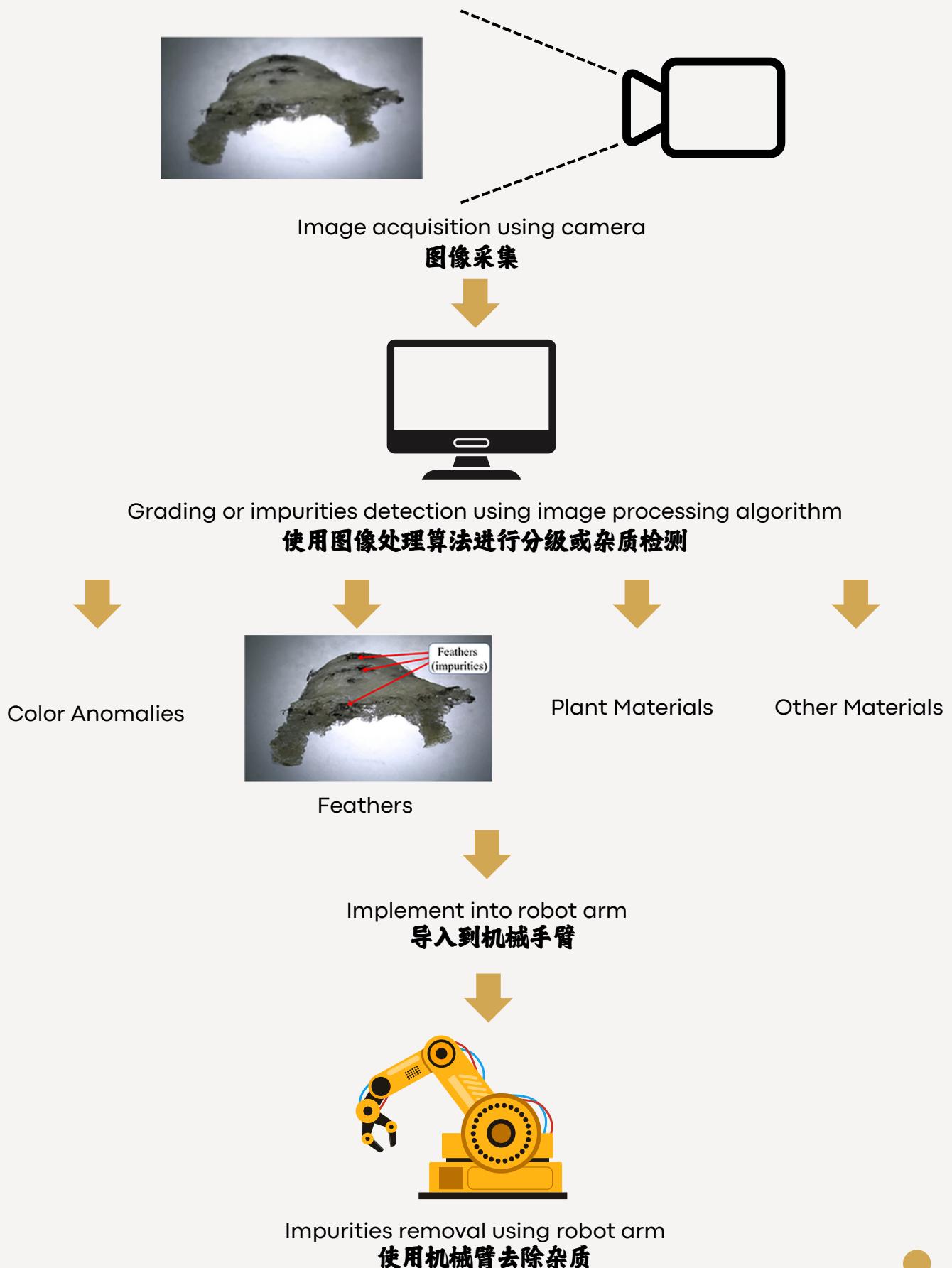
Project Flowchart

项目流程图



Overall Process

整体流程



Project Conclusion

项目总结

Integrating artificial intelligence and image processing technology into the edible bird's nest industry can enhance quality and operational efficiency. This technology offers transformative and innovative solutions. By developing an AI system capable of accurately detecting impurities in edible bird's nests, this project addresses key industry challenges, ensuring product quality and consumer trust. A structured approach from research and data preparation to model development and full deployment ensures the robustness and effectiveness of the solution, facilitating smooth progress and timely adjustments.

The successful implementation of this AI system will significantly raise industry standards, reduce costs, expand market reach, and promote economic growth. This initiative not only addresses current quality control challenges but also enables sustainable development of the edible bird's nest industry, seamlessly combining traditional practices with innovative technology.

将人工智能和图像处理技术融入燕窝行业可提高质量和运营效率，并且这项技术提供了改革性与全新的解决方案。通过开发能够准确检测燕窝杂质的人工智能系统，该项目解决了关键的行业挑战，确保了产品的质量和消费者信任。从研究和数据准备到模型开发和全面部署的结构化方法确保了解决方案的稳健有效，促进了顺利进展和及时调整。

该人工智能系统的成功实施将显著提高行业标准，降低成本，扩大市场覆盖面，促进经济增长。这一举措不仅解决了当前的质量控制挑战，而且还使燕窝行业实现了可持续发展，传统做法与创新技术无缝结合。



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