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A Novel Financial Investment Advisory Method Based on Big Data Intelligence

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Abstract: *robot-advisor plays a significant role in traditional financial institutions because they need to process a massive amount of customer and financial data resources. This article uses the Factor Analysis method for Integrated Evaluation, and it compares different Robo-advisor products in China and other countries to evaluate the Robo-advisor performance in traditional financial institutions with AI and cloud computing. The research includes China Merchants Bank (CMB), Industrial and Commercial Bank of China (ICBC), Betterment, Wealthfront, etc. The result shows that compares to other products in the rest of the world, the Robo-advisors of ICBC and CMB from China have a shortage in customer profiles, the underlying asset of the investment portfolio, product targeting and positioning. According to the result, this article analyses the problem in applying Robo-advisor in traditional financial institutions and provides some development suggestions.*

Keywords: *Traditional Financial Institutions, Robo-advisor, Factor Analysis*

1. Research Background

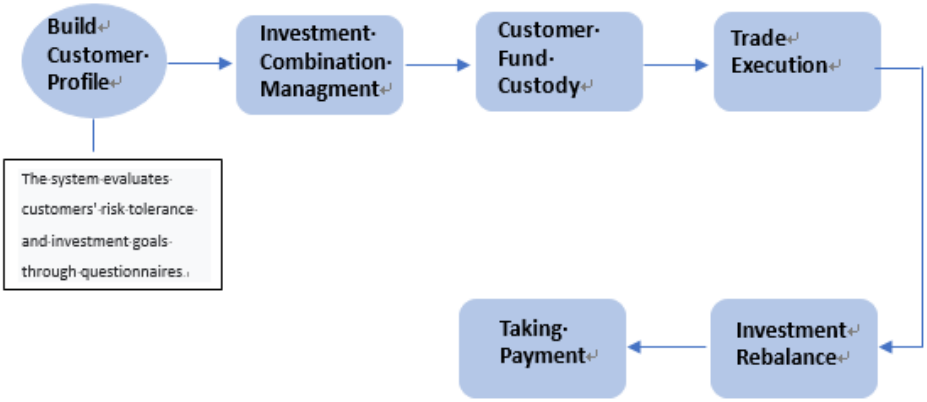

Figure 1: Robo-advisor business model and service process

Robo-Advisor is to produce a robot by using algorithms which can replace human resources to fulfil clients' requirements for financial services [1-5]. The first American Robo-advisor company, Betterment, was established in New York City. After that, many Robo-advisor companies appeared, such as Wealthfront and Personal Capital. These rising companies are mainly based on the Internet, operate with low-cost products and services and are highly digitalized. They primarily target the niche market of young and new market investors. The Robo-advisor services in the US include three categories: 1. Focus on private customers, which means focus on the function of investment, mainly targeting the private customers outside the business; 2. Focus on corporate customers, and the primary users are the internal investment consultant, fund managers and other investors inside the company; 3. The Integral service that both consulting and investing functions are in use. The typical Robo-advisor business mode and

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service process are shown in Figure 1. [6-11]

Around 2015, with the rapid development of American intelligent investment advisors, rising demand for domestic investment advisory services, and widespread acceptance of online banks, the digital mode of an investment advisor is introduced into China, from Internet finance to Bitcoin and Blockchain, financial technology uses its advantages to grow to some extent, and over 50 companies and institutions start and launch intelligent investment services [12-13].

At present, domestic intelligent investment advisors mainly consist of three traditional institutions: Internet companies, professional intelligent investment companies and banks as well as security dealers and funds. The former has the advantage of data, the latter has the advantage of clients. The intelligent investment advisors of intelligent finance service companies start earliest. They all got financial support and have much input of mode and algorithms such as LanHai ZhiTou, CAI Jing, Xuanji, mi CAI, etc.

Internet financial companies usually are the updated versions of online investment advisors, such as help you invest, Jingdong investment, and Baidu stock market pass, which mainly allocates different domestic types of public fund products [14-16].

Compared with the two types of intelligent investment applications mentioned above, although traditional financial institutions are hard to get rid of the existing model, they have a stable base of customers, abundant internal resources and lots of visible historical data. They are facing the world, and domestic public funds are the underlying assets and have obvious late developing advantage. The main representatives are China Merchants Bank Capricorn Intellectual Investment, Industrial and Commercial Bank of China AI Investment, Bank of Jiangsu Alpha Intellectual Investment, Ping the one Zhentong, Harvest Gold Beta, Shanghai Pudong Development Bank Chizhi robot. AI investment as the traditional (banking) financial institutions intelligent investment has important application value.

2. The value of intelligent investment applications in traditional financial institutions

2.1. Has solved two difficult problems of “how to buy” and “how to manage after buying” for individual investors

The application of intelligent investment consulting first solves the problem of "investment" for individual users, that is, "how to buy". Take Capricorn as an example, as long as you tell him the duration of the investment and the level of risk, it will tell you which ones can buy. Among them, the types of funds in the portfolio are fixed income, Cash and currency category, alternative and other categories, and stock category. As the risk gradually increases according to the investment period and the level of risk, the allocation of different proportions. If the level of risk investors can bear is high, the proportion of stocks will be higher; instead, the proportion of fixed income is higher. But now, in China, Capricorn and AI investment and other types of intelligent investments provide almost public fund financial products. On the one hand, it is because there are more than 3000 open-ended funds available in the market, which is easy to match and combine. On the other hand, fund products are relatively standardized. Secondly, it also solves the problem of "how to manage after buying”. For example, after a period of buying the investors, if the net value of the funds in an investor's portfolio changes, the maturity and risk level of the investment will no longer match. Calculating millions of times every day can help investors calculate whether the current portfolio needs adustion, and regularly give suggestions on portfolio optimization, to achieve a one-click optimization portfolio and dynamically adjust the fund products in the portfolio.

2.2. Start the deep integration of human and machine, to promote localized innovation

The cloud computing, artificial intelligence and big data has promoted the increasing creation of application of the financial industry. Nowadays, it has become the mainstream for normal individual investors to access financial services through digital channels, and for the big clients of commercial banks, intelligent investment customers play the role of auxiliary tools. The application process of intelligent investment consulting in domestic traditional financial institutions integrates the experience of such "people". Later, the investment consulting mode originated from foreign countries has a new development in China, which is different from the "dehumanization" in foreign countries and is a kind of localized innovation. Therefore, now large and small commercial banks have entered this field to explore and develop, hoping to make up for the lack of traditional investment consulting business, which will become an inevitable trend in Chinese financial management market.

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2.3. Give the average investors the strategic skills to achieve true diversification

The game atmosphere of Chinese A-share market is strong, with the rational investment lacking. Severe turbulence of a single classification of the assets is hard for most individual investors to bear. Diversification of investments and asset allocation is an effective method, but ordinary investment investors are hard to master because of the expertise and time. However, the Capricorn and AI investment as the representatives of traditional financial institutions intelligent investment management can solved this problem fundamentally. Using machine learning algorithms and integrating years of asset allocation experience of commercial banks, they provide ordinary investors with a set of one-click portfolio allocation tools, effectively disperse risks through global asset allocation, and control portfolio fluctuations within the range of "target-risk".

2.4. Make use of abundant customer resources, accurately target and control customers' wealth

Although the commercial banks including Capricorn Wisdom Investment, AI Investment, Alpha Wisdom investment, smart investment applications are still in the exploratory state and phase, they all have a same advantage, they have large numbers of customer resources and abundant financial datas, which can make the customer portraits more accurately and allocate asset. China's smart investment insurances started not too long, and they really need this data. On the other hand, because of the advantages mentioned above, the traditional financial companies are more accurate in targeting customer needs and wealth, which is more suitable for them. But compared with American intelligent investment banking industry, our intelligent investment banking industry is still in the exploratory stage, with the low degree of intelligence, and the products are basically half intelligent.

3. Comprehensive Evaluation of Factor Analysis of Domestic and Foreign Intelligent Investment Advisory Platforms

3.1. Factor Analysis of Scale

Table 1: Inspection of KMO and Bartlett

Take Enough Sample Measurement of Kaiser-Meyer-Olkin.		.538
Bartlett's Sphericity Test	Approximate Chi-square	116.448
	df	45
	Sig.	.000

The inspection results of KMO and Bartlett are shown in Table 1. Wherein, the value of KMO is 0.538, which is suitable for factor analysis; the value of Sig in the Bartlett's Sphericity Test is 0.000, which is less than the significant level (0.05); hence, the rejection of the original hypothesis indicates that there is a correlation between variables, which is suitable for factor analysis.

Following Table 2, only the eigenvalue of the first three factors is greater than 1,and the sum of the eigenvalues accounts for 84.862% of the total eigenvalues, that is, their cumulative contribution to all index data reaches 84.862%; hence, the first three factors are extracted as the main factors.

Table 2: Interpreted Total Variance Table

Component	Initial eigenvalue			Extraction square and load			Rotation square and load		
	Total	Variance %	Accumulation %	Total	Variance %	Accumulation %	Total	Variance %	Accumulation %
1	5.283	52.827	52.827	5.283	52.827	52.827	4.109	41.085	41.085
2	1.847	18.468	71.295	1.847	18.468	71.295	2.505	25.046	66.131
3	1.357	13.567	84.862	1.357	13.567	84.862	1.873	18.731	84.862
4	.556	5.557	90.420						
5	.475	4.753	95.173						
6	.310	3.098	98.270						
7	.090	.897	99.167						
8	.060	.604	99.771						
9	.020	.199	99.970						
10	.003	.030	100.000						

Extraction method: principal component analysis.

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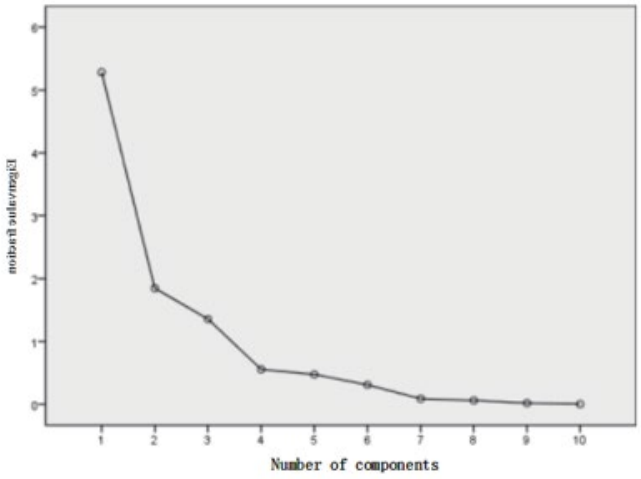

Figure 2: Detritus Figure

In accordance with Figure 2, the eigenvalue slope becomes more stable from the fourth factor, hence, the first three factors are selected as the main factors.

Table 3: Rotation Component Matrix a

	Component		
	1	2	3
Time to market	.903	-.009	.058
Target asset category	.879	.133	.379
Target asset type	.862	.408	.238
User group	-.821	-.242	.409
Asset scale	.796	.576	-.018
Strategy report meeting	.003	.961	.061
Risk level	.313	.781	-.095
Artificial investment advisory service	.583	.615	.135
Customer portrait	-.016	-.073	.875
Automatic warehouse adjustment	.182	.113	.840

Extraction method: principal component.
Rotation method: Varimax rotation method with standardized Kaiser.
a. The rotation converges after 5 iterations.

The factor load values after rotations are shown in the Table 3. Each factor has a clear meaning of use based on factor rotation: the first main factor is mainly related to the time of market, target asset category, target asset type and asset scale; the second main factor is mainly related to the strategy report meeting, risk level and artificial investment advisory service; the the three main main factor is mainly related to automatic warehouse adjustment and customer portrait.

3.2. Principal Component Analysis

Table 4: Eigenvector Matrix Table

F1	F2	F3
0.42	-0.11	0.02
0.03	0.63	0.14
0.29	-0.22	0.37
0.37	0.26	-0.24
0.36	-0.02	0.18
-0.33	0.32	0.30
0.23	-0.15	0.67
0.33	0.06	-0.42
0.14	0.58	0.17
0.42	0.10	-0.07

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Calculation formula of principal component:

$$Z1=0.42X1+0.03X2+0.29X3+0.37X4+0.36X5-0.33X6+0.23X7+0.33X8+0.14X9+0.42X10$$

$$Z2=-0.11X1+0.63X2-0.22X3+0.26X4-0.02X5+0.32X6-0.15X7+0.06X8+0.58X9+0.10X10$$

$$Z3=0.02X1+0.14X2+0.37X3-0.24X4+0.18X5+0.30X6+0.67X7-0.42X8+0.17X9-0.07X10$$

Table 5: Standardized Variables

Z Asset scale	Z Customer portrait	Z Risk level	Z Target asset category	Z Artificial investment advisory service	Z User group	Z Strategy report meeting	Z Time to market	Z Automatic warehouse adjustment	Z Target asset type
0.26345	-2.00000	0.94610	-0.92582	-0.40967	-1.21529	-0.64051	-0.27735	-1.44115	-0.52623
-0.76400	1.00000	-0.59131	0.00000	-0.40967	0.75955	-0.64051	-0.27735	0.64051	-0.52623
-0.76400	0.00000	-2.12872	-0.92582	-0.40967	0.75955	-0.64051	-0.27735	-1.44115	-0.52623
-0.42152	0.00000	0.94610	-0.92582	-0.40967	0.75955	1.44115	-0.27735	-1.44115	-0.52623
-0.76400	1.00000	-0.59131	0.00000	-0.40967	0.75955	-0.64051	-0.27735	0.64051	-0.52623
-0.76400	0.00000	-0.59131	0.00000	-0.40967	0.75955	-0.64051	0.44376	0.64051	-0.52623
-0.76400	-1.00000	-0.59131	0.00000	-0.40967	0.75955	-0.64051	-0.27735	0.64051	-0.52623
-0.07903	-1.00000	-0.59131	0.00000	-0.40967	-1.21529	-0.64051	-0.27735	-1.44115	-0.52623
-0.07903	0.00000	0.94610	-0.92582	-0.40967	0.75955	1.44115	-1.71957	0.64051	-0.52623
-0.76400	1.00000	-0.59131	-0.92582	-0.40967	0.75955	-0.64051	-0.99846	0.64051	-0.52623
1.29089	1.00000	0.94610	1.85164	-0.40967	-1.21529	-0.64051	1.88598	0.64051	1.75412
1.63337	-1.00000	0.94610	0.92582	2.25320	-1.21529	1.44115	1.88598	0.64051	1.75412
1.97585	1.00000	0.94610	1.85164	2.25320	-1.21529	1.44115	0.44376	0.64051	1.75412

Table 6: Results of Principal Component Variable Analysis

	Z1	Z2	Z3
Machine Gene Investment	-0.43	-2.93	-0.66
Xuanji	-1.23	1.49	-0.11
JD Intelligent Investment	-2.34	-0.25	-0.95
Financial Rubik's Cube	-0.83	-1.27	1.59
Itoumi RA	-1.23	1.49	-0.11
MiCai	-1.02	0.91	-0.55
HuiNiu	-1.29	0.23	-0.39
AI Investment	-0.64	-1.68	-1.32
Your Investment Assistant	-0.87	-0.19	2.56
Quantitative Wealth Cat	-1.81	1.21	0.42
Wealthfront	3.09	1.14	-1.60
Betterment	4.27	-0.77	0.22
Schwab Intelligent Portfolios	4.34	0.61	0.89

The cumulative contribution rate of the three main factors to the indicators reached 84.862% (as shown in Table 2 and the Table 4-6 showed the data samples' calculation process), hence, this can reflect the information of most samples, and the comprehensive score model can be obtained through weighted average by taking the corresponding variance contribution rate as the weight:

$$P=62.3\%Z1+21.8\%Z2+16\%Z3$$

After that, the total score can be obtained by substituting the data of each platform into the model, and the final ranking in accordance with the total score is shown in Table 7:

Following the results of a comprehensive evaluation by factor analysis shown in Table 7, the total scores of Machine Gene Investment and AI Investment rank lower, and the comprehensive scores of foreign intelligent investment advisory platforms are generally higher than those of domestic intelligent investment advisory platforms. Compared with foreign mature intelligent investment advisory platforms, the following differences exist in domestic intelligent investment advisory platforms (such as Your Investment Assistant, Xuanji, Machine Gene Investment, and AI Investment):

1) Different creation background and late start. The American Financial Crisis broke out in 2008, which led to the establishment of Betterment. Generally speaking, compared with the initial development

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of the application of intelligent investment advisors in America, the application of intelligent investment advisers in China started very late; the intelligent investment adviser of domestic traditional financial institutions (including Machine Gene Investment) only appeared in 2016, and to a large extent, the growth of the economic level, the development of financial science and technology, and the social demand for financial management market have reduced its asset management scale.

Table 7: Comprehensive Score of Factor Analysis of Domestic and Foreign Intelligent Investment Advisory Platforms

Schwab Intelligent Portfolios	Betterment	Wealth front	Your Investment Assistant	Xuanji	Itoumi RA	MiCai	Financial Rubik's Cube	Quantitative Wealth Cat	HuiNiu	AI Investment	Machine Gene Investment	JD Intelligent Investment
2.98	2.53	1.91	0.04	-0.17	-0.46	-0.46	-0.54	-0.80	-0.82	-0.98	-1.01	-1.66

2) Different information collection degree of customer portrait ③. In addition to the questionnaire, the customer portrait conducted by the intelligent investment advisor in America also includes tracking customer behavior. The customer portrait conducted by the intelligent investment advisor of domestic traditional financial institutions is often based on the completion of customer questionnaires; the questionnaires of AI Investment and Machine Gene Investment only include two questions, which shows their single customer portrait and low level of information collection.

3) Different asset target of investment portfolio. The target of foreign intelligent investment adviser and investment is index ETF (global); in addition to for stocks and bonds, the investment portfolio also includes real estate, natural resources and other assets, the investment target assets are relatively rich in product types and quantities. However, the asset targets of investment portfolios of Machine Gene Investment and AI Investment are mainly public funds, and the number is small.

4) Different product service object and service mode positioning. The intelligent investment advisor in America can be divided into three categories of 2C, 2B and comprehensive services, with clear investment adviser positioning and clear service target; for instance, Betterment focuses on "adviser" at the B-end, mainly targeting B2B2C, investment management and suggestions, as well as large accounts and individual retirement accounts; Wealthfront is positioned as the "investment" of the C-end, focusing on wealth management, especially in tax optimization, mainly for high-tech professionals in their 20s and 30s. Although currently focusing on the "investment" of C-end consumers, Machine Gene Investment and AI Investment do not have a clear investment advisory boundary.

4. Analysis of the problems existing in traditional financial institutions' robot-advisors

4.1. The customer group is relatively general, and the strategic direction of the robo-advisor is unclear

At this stage, traditional financial institutions mainly provide intelligent "investment" services for individual customers, but there is no clear definition of the scope of intelligent "advisory" services provided by wealth advisors or fund managers, and the definition of investment advisors is not clear. In fact, the investment advisory services required by individual clients on the C side are different from those required by wealth advisors or fund managers on the B side. The main requirement is a simple and easy-to-understand investment portfolio that brings high returns to it; while advisors or managers have the ability to invest, the main requirement is to help clients make investment decisions more efficiently, in real time and accurately through robot-advisors. Therefore, the development direction of robot-advisory applications in traditional financial institutions and the determination of customer groups need to be further clarified and refined.

4.2. The assets of intelligent "investment" have a single type of underlying products, and the concepts of intelligent investment advisory over its substance

At present, in the investment portfolios given by the robo-advisors of traditional financial institutions in my country, their asset targets are all public funds, and most of them are active and have a single type. The realization of robo-advisors is based on the quantification of subdivided products. The investment portfolios of foreign robo-advisors are mainly efs. As of the end of 2018, there were 1,988 ETF funds in the United States, with an asset size of about 3.37 trillion US dollars. Therefore, if the types of investment targets of traditional domestic financial institutions' robo-advisors cannot be more abundant, it is impossible to effectively allocate assets. All in all, the future development of domestic robo-advisors should focus on substance.

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4.3. The overall intelligence of robo-advisors is relatively low

Through the investment experience of common financial products, we can clearly know that different investment needs and different application scenarios require different investment portfolios and investment plans, so as to achieve "thousands of people and one thousand faces". However, the current domestic traditional financial institution robot-advisors are too simplistic, static, and single in the survey of customer portraits, so the degree of intelligence and automation is also low. At the same time, the development time of domestic robot-advisors is relatively short, there are still problems in the accumulation of data, and the development of technology is also insufficient. Therefore, the intelligent development of robot-advisors of traditional financial institutions still requires time accumulation, technological progress, and accumulation of experience.

4.4. Data coverage is broad but imprecise

80% of the contribution for the development of artificial intelligence is attributed to the rich accumulation of data, and 20% to the continuous improvement of algorithms. In the financial industry, data is easy to label, which is an important reason why artificial intelligence can develop in the financial field. In terms of data accumulation, although the amount of data obtained by traditional domestic financial institutions' robot-advisors is relatively large, the dimension is still very single and not "refined". Because robot-advisors mainly provide accurate investment services through customer portraits and asset characterization. However, the development of robot-advisors in domestic traditional financial institutions is still not perfect in terms of data integration, because my country's data integration model is immature and lacks large platform-based data companies, which also causes valuable data to be scattered and the access cost is high. This also brings huge challenges to the overall robot-advisory application in China.

5. Suggestions for improvement of traditional financial institutions' intelligent investment adviser

5.1. Clarify strategic positioning and develop different versions of Intelligent investment consulting

Traditional financial institutions should identify intelligent "investment",and the strategic positioning of intelligent "Gu" and the corresponding business model target different customers. Provide different robot-advisor application versions, allowing customers to choose independently. Achieving both intelligent "investment" and "guiding". In traditional Chinese financial institutions, the client groups of robo-advisors are usually divided into three categories: ordinary individuals who lack investment advisors, personal customers, the public with certain assets and financial management, internal financial institutions' Senior Consultant Managers, etc. Therefore, three versions of robot advisors can be set up, Including regular, advanced, and professional editions. Different versions are aimed at different groups of people. There are differences in product mix, risk settings, etc. For example, the normal version passes Scientific Investment Methods recognized in finance, including portfolio investment, asset allocation, and other concepts to guide investors to rationally allocate their assets. This kind of setting will be more comprehensive and scientific and can better satisfy each type of customer and the needs of the group to achieve the optimization of asset allocation and maximization of income.

5.2. Improve regulatory policies, strengthen market cultivation, and diversify investment targets

The stable development of the robot-advisory market of traditional financial institutions, in addition to the need for various in addition to the data accumulation and technological progress of the robo-advisor operation platform, it also requires national The continuous improvement of domestic-related policies has enriched the investment of robo-advisors of traditional financial institutions investment targets in the portfolio, thereby promoting my country's wealth management market and robo-advisory market field development. At present, my country's investment advisory and asset management are separate. Root According to relevant laws and regulations, investment advisors can only provide investment advice, not delegated transaction management. Such laws and regulations limit the investment of robot-advisors in my country.

The recommended range of the types of bids is relatively unfavorable for its development. Therefore, build it is suggested that the People's Bank of China and the China Banking and Insurance Regulatory Commission can improve both macro and micro aspects. The supervision mechanism, clarifies access conditions, strengthens innovation encouragement and guidance, and improve the market enthusiasm of

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the main players in the market, to solve the mixed situation of good and bad in the application of robot-advisor conditions, and to promote the orderly development of market norms. Of course, robot-advisors operating platforms should also take the initiative to submit the platform transaction behavior indicator report to the regulatory authorities, ensuring that its behavior is compliant and legal to avoid losses to investors.

5.3. AI+HI, mainly artificial intelligence, supplemented by fund managers

Traditional financial institutions' robo-advisors are less intelligent, except for traditional financial institutions.

In addition to the technical shortcomings of financial institutions, part of the reason is the sorting and analysis of data questions. Therefore, human intervention in robot-advisors is very important at this stage. On the one hand, the process and method of generating income in the financial market often need only the thinking, understanding and innovation of the human brain can be structured into a proper model.

On the other hand, in my country's traditional investment advisory methods, the relationship between users and investment advisors there is more interactions between them, which can involve real estate investment, children's education Planning and other wealth management services, so the investigation of customers is more in-depth, investment advisory program design is also more accurate. Therefore, from the user's point of view, in addition to enriching investment advisory solutions and product portfolios, the robot-investment of traditional financial institutions Gu also needs to carry out appropriate humanistic care and follow-up inquiries during the investment process. Fully give users guidance on the correct investment concept. In summary, my country's intelligent investment in terms of the status quo of Gu Gang's start-up, artificial intelligence is the mainstay, and fund managers, financial The rich consultant-assareted model is more suitable for the current development.

5.4. Technology + traffic, complements each other's advantages, and improve the "precision" of financial big data

The development of robot-advisors of traditional financial institutions has the advantage of rich data, but in the same time there are also technical disadvantages. Although large and medium-sized traditional financial institutions in my country banks have cooperated with Internet financial companies such as BATJ very early, there are still some Although small and medium-sized banks lacking hard technology have the idea and sharpness to enter robot-advisory meet the needs of innovation, but it is often hampered by its weak technical capabilities and high upfront investment costs, it is difficult to advance similar innovations, so they can achieve mutual advantages by cooperating with Internet financial enterprises with technological advantages repair. Also, large banks have huge data traffic but are sensitive to risk, If it takes the form of mutual empowerment with large Internet companies or platforms, let the technology fully integrated with data traffic, it is possible to maximize the integration of traditional financial institutions the robot-advisors have made this cake bigger and better.

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